

modern machine shop

QUALITY CONTROL
VITAL TO NEW
CAR PRODUCTION
See Page 108

UNUSUAL SHEET
METAL FORMING
METHOD
See Page 116
FEBRUARY 1960

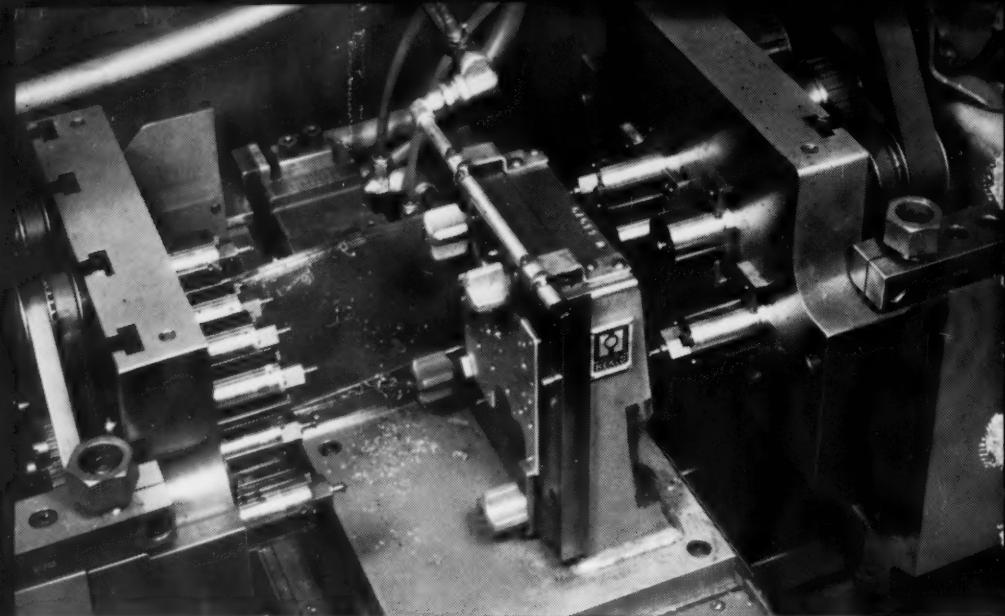
PRECISION SAWING WITH THE INCOMPARABLE

LENOX BAND SAW BLADES

ROBERT "BOB" LARSON,
Lenox Band Saw Superintendent,
over 50 years service.



AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASSACHUSETTS • U.S.A.



Bore 23 holes on 1 machine

*Heald Model O Bore-Matic
solves multiple-hole Borizing problem
with interchangeable Multi-Spindle Heads*

The Problem — to precision bore 23 holes, ranging from .0365" to .3570" in diameter, in medium-hard aluminum gear-box plates, with a tolerance of .0005" on diameter and .0009" on centers — also to bore 12 similar holes in a matching plate.

The Solution — a Heald double-end Model O Bore-Matic equipped with two sets of interchangeable Multi-Spindle boringheads. As shown in the drawings at the right, the 23-hole plate is precision Borized to the required tolerances in only three operations, using an indexing cross-slide and with all holes accurately positioned by cross-slide index and spindle location. One set of Multi-Spindle heads is used for

the first two operations — then spindle plates are changed for the final operation. The second set of spindle plates also finishes all bores in the 12-hole plate in two operations. Average production is 10 parts per hour.

Heald Multi-Spindle boringheads consist of interchangeable spindle plates, precision bored to mount the desired number of miniature Red-Head boringheads which are belt-driven from a single motor. This arrangement permits simultaneous Borizing of multiple holes with center distances as close as $\frac{3}{4}$ ". To save production time and cost on your multiple-hole borizing jobs, ask your Heald engineer for complete information on Model O Bore-Matics.



MMT=pE

THE **HEALD** MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

It PAYS to come to Heald



1. Bore 23 holes in single-end cycle using spindle plate No. 1.



2. Bore 7 holes in double-end cycle using spindle plates No. 1 and 2.



3. Replace spindle plates No. 1 and 2 with No. 3 and 4 and bore 14 holes in double-end cycle.

(Arrows show direction of table travel for holes indicated)

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modern machine shop

The
Idea-Full
Magazine

Vol. 32, No. 9, February, 1960

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Grinding
Cold Heading
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Safety
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Gaging

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Member



A Statement of Policy

The principal function of MODERN MACHINE SHOP is to search out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency in the metalworking industry, and neither effort nor expense is, or shall be, spared in the performance of this task.

FEATURES

FEBRUARY 1960

PRODUCTION AT PLYMOUTH ASSEMBLY PLANT

By Fred W. Vogel

Extensive changes in manufacturing facilities has enabled Plymouth Division to introduce new type automobile construction in 1960 models.

Page 108

HOW TO SOLVE SUPERVISORY PROBLEMS

By Alfred M. Cooper

Toolmaker is given answer to problem as to whether or not he should accept a promotion to the position of foreman.

Page 114

UNUSUAL FORMING METHOD

By W. E. McFee

Newly developed process known as "Cryoforming" controls and directs sheet metal growth caused by heat-induced phase change.

Page 116

SURFACE FINISHING ALLOY STEELS

By John E. Hyler

Author describes a method of grinding hardened alloy steels which is designed to assure the production of high quality, accurate surfaces regardless of the hardness of the particular material which is being ground.

Page 120

COLD HEADING AUTOMOTIVE STUDS

By Barilett West

Case history points out how change in steel solves die-cracking problem in producing studs for automotive ball joint suspensions.

Page 122



in this issue

VOL. 32 • NO. 9

TOOLS FOR THE WRONG TRADE

By J. Edgar Hoover

"Combating the criminal craftsmen who specialize in tool thefts requires the diligent assistance of all law-abiding individuals," so says the Director of the Federal Bureau of Investigation in his enlightening discussion.

Page 124



DESIGN FOR A PROGRESSIVE DIE

By Russell Kindt

Discussion covers the construction and operating details of three-station five-operation progressive die for automatic lighter part.

Page 128

PRODUCING COMPRESSOR COMPONENTS

By Ira S. Roberts

Twenty-nine automatic operations are performed on each component produced by General Electric Company's Tyler, Texas plant.

Page 134

SAFETY IS NO ACCIDENT

By Clyde F. Schlueter

Safer working conditions in the metalworking plant or department require the constant vigilance of every person in these areas.

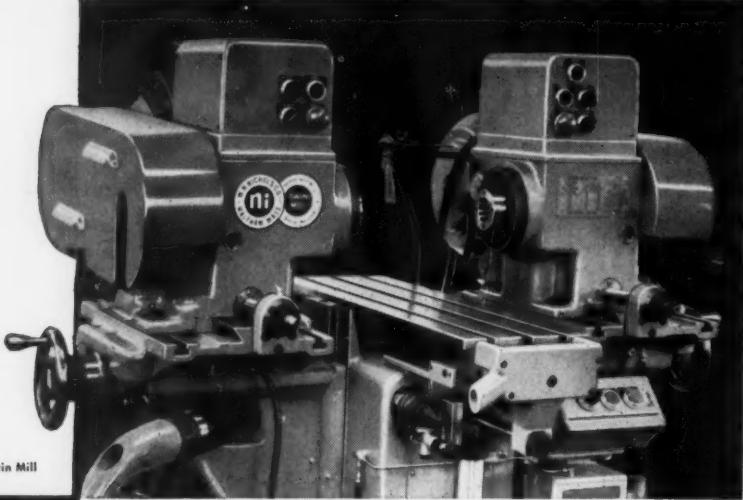
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MORE PRODUCTION THROUGH MODERNIZATION

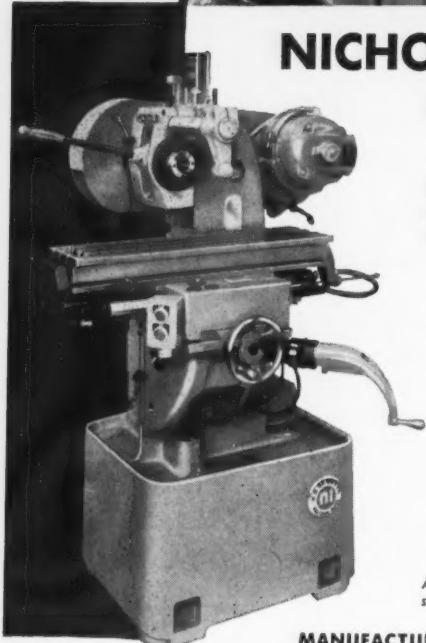
Section includes a number of application stories discussing techniques for increasing output on a wide variety of metalworking operations with newly developed machines and tools.

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modern machine shop



NICHOLS MILLERS...



Ideal Basic Machines for Automatic Production

NICHOLS MILLERS are versatile, work-devouring machine tools, unexcelled in accuracy and fine workmanship.

The TWIN MILL is practically TWO milling machines in ONE. Opposed Milling Heads have SIX-WAY adjustability for quick set-up and flexible approach to complex light milling operations. Push a button, and an automatic table cycle gives you TWO completed milling cuts. This unique duplex Miller is a cost-cutter without equal! For high production precision milling where the double-barreled approach of the TWIN MILL is not required, there are single spindle NICHOLS Semi-automatic Millers of varying work ranges. In addition to automatic table cycles, synchronized automatic down-feed of spindle head and automatic cross feeds are available.

NICHOLS MILLERS have a magnetic attraction for the Tool Engineer's ingenuity.

Write for literature and illustrations.

A NEW 16 mm. sound, color movie is available for free showing. May we reserve it for you?

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SAVE

On Base Price!
On Maintenance!

On Set-up Time!



Typical parts produced by 2½" Model AW Cleveland, at profitable production rates, with simple tooling. Ask your CLEVELAND representative to submit a cost analysis with production estimates on your work.



with the low-cost **CLEVELAND**
2½" model AW single spindle automatic

With a base price of \$4000 to \$5000 less than other comparable automatics, this Model AW Cleveland will set an unbeatable production pace in your shop. Not only is it fast, precise and highly versatile, it is a rugged, fool-proof automatic, free from complicated mechanisms and controls that require constant adjustment and maintenance.

Quick and easy to set up, this Cleveland features universal camming — rapid, hand crank stock feed adjustment—quick change collet pads—four automatic spindle speeds for each set of

pick-off gears. An easily accessible tooling area is provided by wide, independent double cross slides and large diameter 5-hole turret. Forty spindle speeds —69 to 1920 rpm—give you efficient speeds for all types of materials and tools. Forward and return turret tool feeds are infinitely variable through a simplified mechanical drive.

With the 2½" Model AW Cleveland, you can cut your costs three ways:—ON BASE PRICE—ON SET-UP TIME—ON MAINTENANCE. For detailed machine specifications, write for AW Bulletin.

REMEMBER,
Cleveland's Cut Costs!

Sales Offices: Chicago • Cleveland • Detroit • Hartford • Springfield, N.J.

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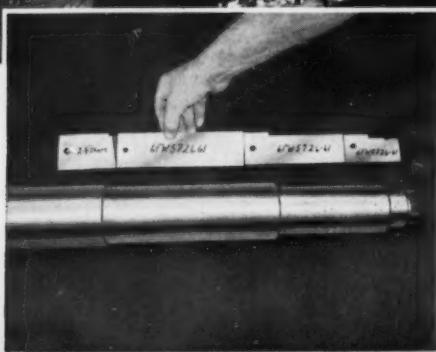
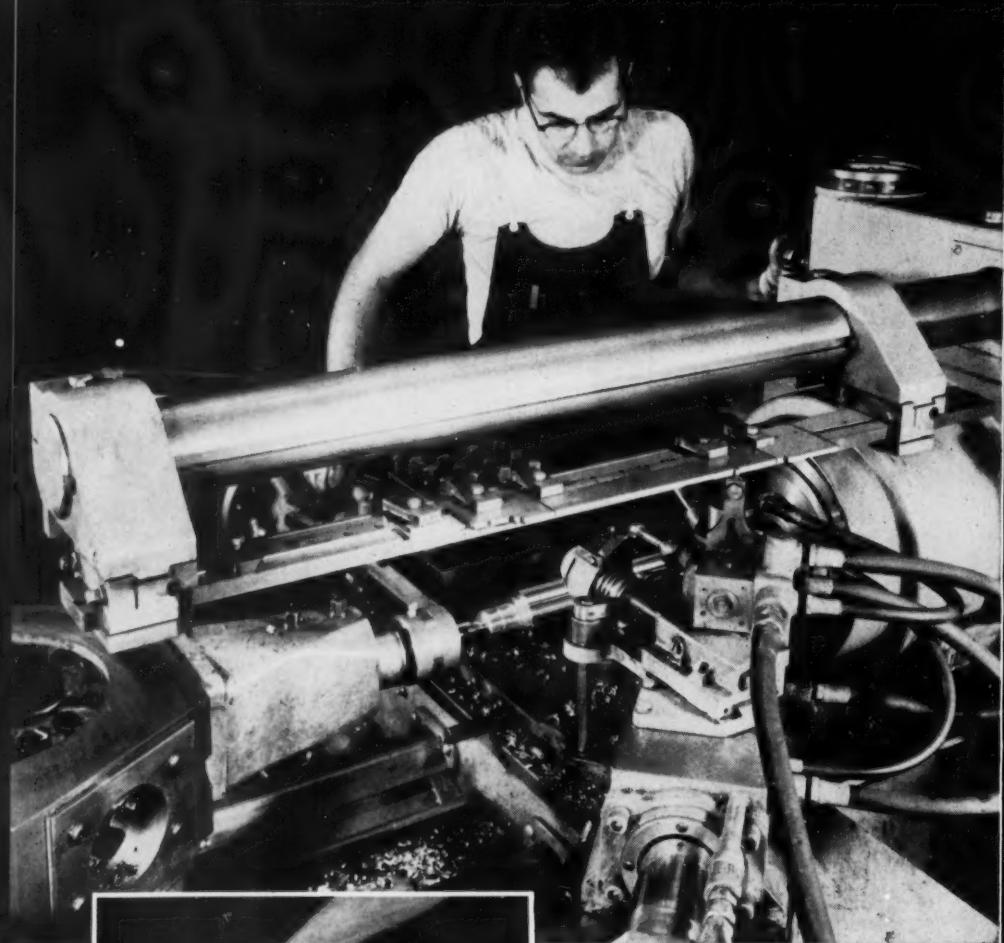
Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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AT **HOBART BROTHERS COMPANY**

TROY, OHIO

a Warner & Swasey 2-A with contouring



Unique Section Template was one idea which Hobart tooling specialists came up with to reduce setup time and minimize template costs. A short template was made up to handle a range of shafts with similar ends. Various length middle sections could then be quickly inserted to obtain various lengths and shoulder locations.

cross slide SLASHES SETUP TIME FROM 2 HOURS TO 20 MINUTES

• Combines auxiliary operations into one setup

Hobart Brothers Co.—a leading producer of arc welding equipment and aircraft ground-power units—faced a serious production bottleneck. Long setup time on their older turret lathes and excessive part handling time was crippling the small lot production of motor-generator shafts.

Hobart launched a three-pronged attack to solve the problem by:

1. Installation of a new Warner & Swasey 2-A Saddle Type Turret Lathe equipped with a hydraulically-controlled cross slide contour unit.
2. A creative tooling approach to reduce setup time.
3. A thorough time and motion study to insure efficient utilization of daily production time.

As a result, Hobart Brothers today are producing shafts at 1948 production costs!

Contributing to the success of this efficiency study and modernization program was their new contour cross

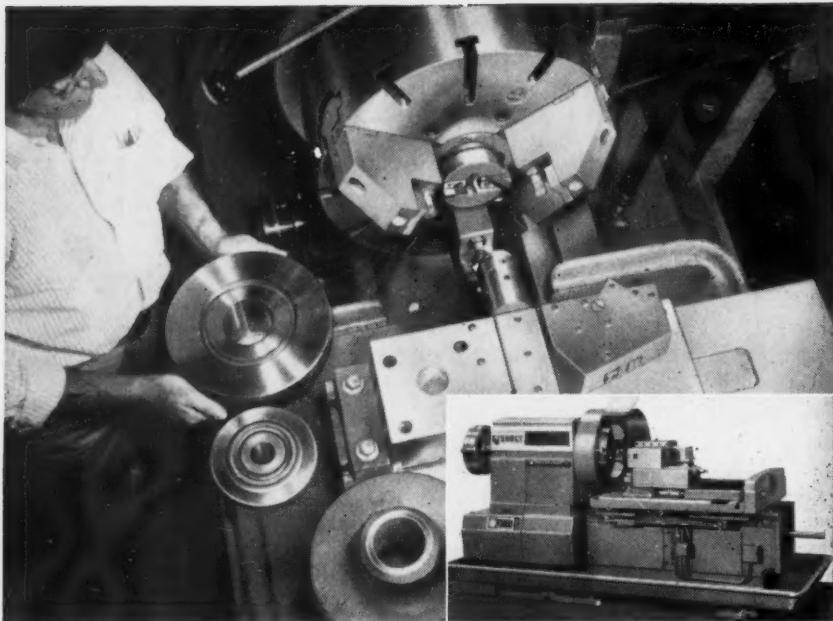
slide equipped Warner & Swasey 2-A which permitted:

- Combining of center drilling, facing and threading operations into a single, efficient turret lathe setup reducing part handling time.
- Production time savings averaging 35% because of higher horsepower and spindle speeds, and elimination of extra hex turret and square turret handling time. All diameters and grinding reliefs are produced directly from the template.
- Holding closer tolerances which reduced grinding time and extended grinding wheel life.

Check today with your Warner & Swasey Field Representative. He'll gladly tell you how the cost-cutting results of the "Hobart Story" can be a reality on your own operations.



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY
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Smart planning on Simplimatic holds f.t.f. time to 1.7 min. on 6½" diam., 3.3 min. on 10¾" diam. workpieces.

How OTM Corp. cuts costs machining parts in 13 sizes

Handles each part in single chucking, using Simplimatic with back-facing attachments and two-speed motor

You may get ideas from the way OTM Corporation, Houston, Texas, machines steel welding neck flanges and welding necks—with each part in 13 different sizes—completing each part in a single chucking and holding change-over time to an absolute minimum.

Here's how the job is done on a Gisholt Simplimatic Automatic Lathe: Facing, grooving, boring and chamfering operations are performed from tools on short tool slides, with T-slotted tops for quick adjustment. Relieving the boring tool at the end of the cut eliminates tool tracks. Simultaneously, a special back-facing attachment works through the spindle to shave-face and chamfer the O.D. on the hub. A power chuck wrench operates the scroll chuck and permits mounting this attachment in the spindle bore. A two-speed motor

provides correct surface speed and permits switching from high speed (for turning and facing) to low speed (for grooving operation) and back again, during the Simplimatic's automatic machining cycle.

Here, again, the Gisholt MASTERLINE Simplimatic Automatic Lathe saves a manufacturer the cost of a special machine. Its extra wide platen table provides ample space for an infinite number of slide and tool arrangements—and its table feed permits tools to engage with the work or perform additional machining operations before actual slide movements begin. Ask your Gisholt Representative to show you how the Simplimatic performs special machine functions at standard machine prices—on your product and under your production conditions.



GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for new Catalog 1159-C on Gisholt MASTERLINE Simplimatic Automatic Lathe. Shows 39 typical jobs—fully illustrated.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE
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Spartan



SPARTANIZED BAND SAWS

Our new Spartan Band Saw for friction cutting at high speeds of 10,000 ft. or more per minute, exceeds user's expectations for maximum cutting performance and value.

Like all other Spartan Saws it has our SPARTANIZED Heat Treatment and is another unusual blade.

METAL CUTTING

- High Speed
- Regular
- Die Cutting
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- Skip Tooth
- Wavy Set

WOOD CUTTING

- Wide
- Narrow

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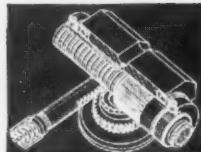
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YOU'LL BENEFIT FROM THESE *Cost-Reducing Features* OF THE CINCINNATI MI Line

It's a pleasure to see the smooth cutability of CINCINNATI ML and MI Milling Machines. Built for medium-duty work (3 to 10 hp), they take cuts at full power with never a sound of strain. And they're equipped to give the operator a fast start . . . a prime consideration for your toolroom equipment. Some of the exclusive feature-advantages which give the MI line the highest rating for variety and production work are illustrated here. Others include:

- Independent and directional feed control levers.
- Extra large micrometer dials; the quickly set, pull-out type.
- All hand cranks automatically disengage in power feed.
- Live rapid traverse, 150 ipm.
- And for vertical machines, power feed and rapid traverse to the vertical head, including four-position turret stop.

No other medium-duty knee type milling machine combines so many toolroom feature-advantages with the production possibilities of automatic reciprocating table cycles. May we give you more information? Ask for catalog No. M-1995-3, or a visit by one of our field men.



Automatic Backlash Eliminator operates without attention. There is always a snug fit between feed screw and nut for "climb" milling.



Dynapoise Overarm dampens self-excited chatter; increases feed rate for troublesome jobs.



Arbor-Loc spindle nose helps operator change cutters safely and quickly (in 20 seconds or less).

BUILDERS OF FINE MACHINE TOOLS: KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES •
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



CINCINNATI Dividing Head is a highly precise attachment for milling gear teeth and for other toolroom and production work. It is standard equipment on all ML and MI Universals.

	Style and Size	Spindle Drive (hp)	Table Travel
PLAIN	203-10 ML	3	28"
	205-10 MI	5	28"
	307-14 MI	7½	34"
	410-14 MI	10	42"
UNIVERSAL	203-10 ML	3	28"
	205-10 MI	5	28"
	307-14 MI	7½	34"
	410-14 MI	10	42"
VERTICAL	205-10 MI	5	28"

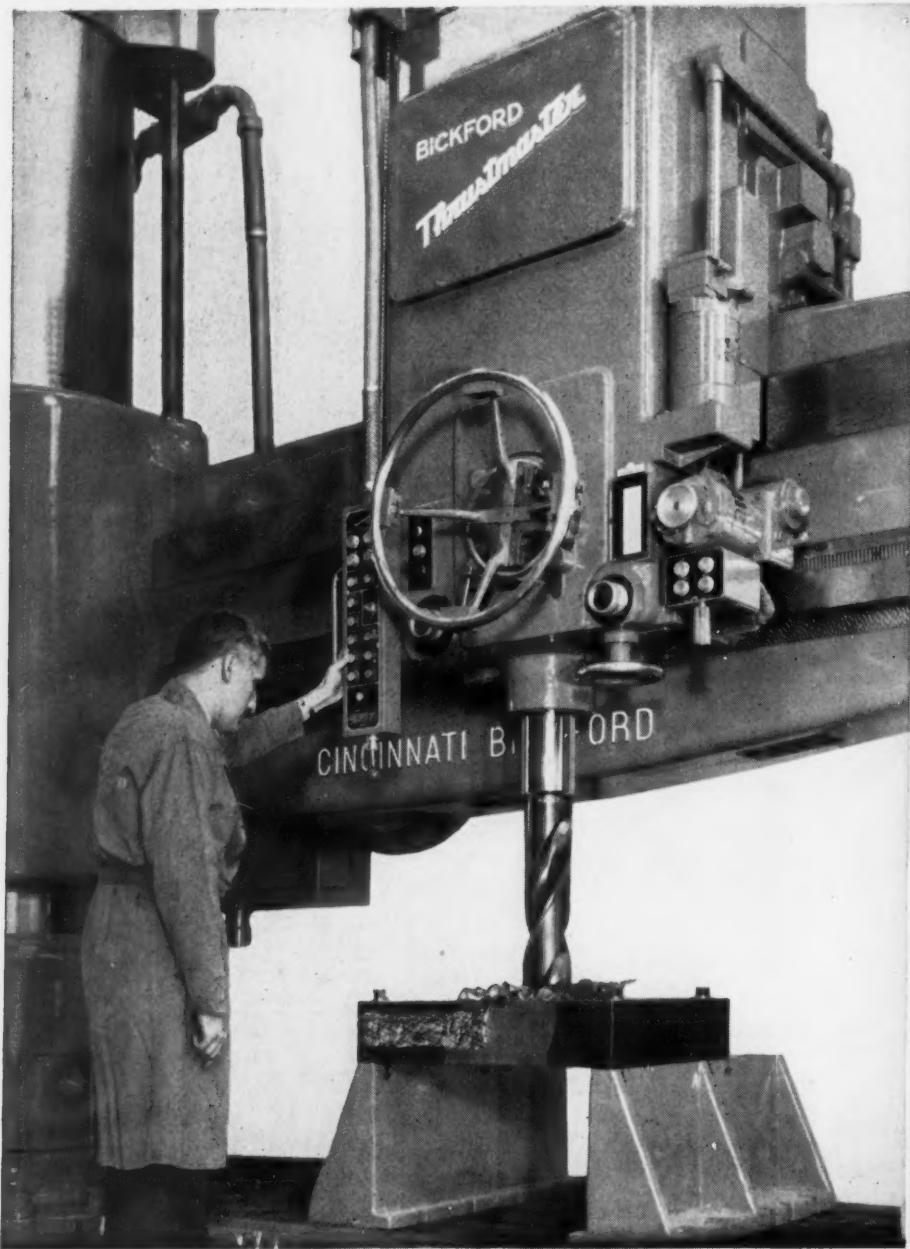
Catalog No. M-1995-3

UTTER AND TOOL GRINDERS • ELECTRICAL DISCHARGE MACHINES

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MILLING MACHINE DIVISION

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Morse Drills



Do It Again...

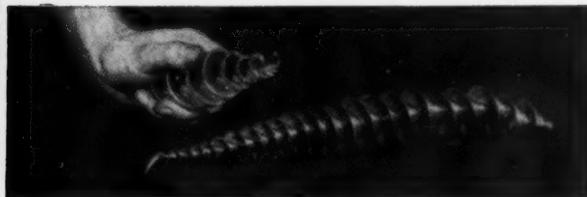
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To demonstrate their new 50-horsepower, pushbutton-operated Thrustmaster...the most powerful radial drill ever built... Cincinnati Bickford tooled up with the toughest twist drill on the market—Morse.

Why Morse? Because other drill manufacturers threw up their hands at producing a drill to match the Thrustmaster's power. But Morse took on the job, applied a regular taper shank drill right off

the shelf that more than meets the requirements of this exceptionally powerful machine.

If you haven't already experienced the demonstrated superiority of the world's most complete line of quality cutting tools, call your Morse-Franchised Distributor today. He'll gladly show you the practical economies of buying the best... Morse Cutting Tools.



Look at these chips made during demonstration of the Thrustmaster.

Feed: .067" per revolution at 105 RPM

Drill: Regular Morse Taper Shank Drill
(style 1302) driven in solid steel.



Morse CUTTING TOOLS

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS

WAREHOUSES IN NEW YORK, CHICAGO, DETROIT, DALLAS, SAN FRANCISCO

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MORSE means "THE MOST" in Cutting Tools
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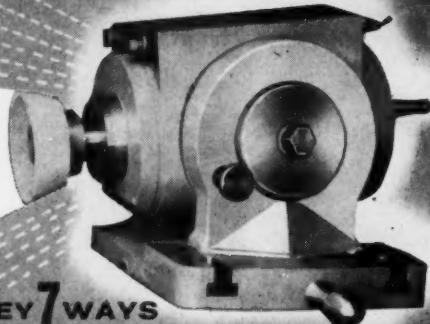
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AND A NEW APPROACH

THAT SAVES YOU MONEY 7 WAYS

ON ALL YOUR TOOL AND CUTTER GRINDING



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MOTORIZED TOOL AND CUTTER GRINDER
CLEARANCE ANGLE SWIVELLING HEAD WITH
ANGULAR ADJUSTMENT IN A VERTICAL PLANE

and get these seven savings:



1. Strong, long lasting tool cutting edges because cup wheel cutter grinding can be used for practically all clearance angles.
2. Tooth rest stays on the center line of the cutter for practically all grinding on centers or in the work head.
3. A single set-up grinds most cutters and reamers all over, using the swivelling table and Pope tilting head.
4. No more mistakes on clearance angles. They read directly in degrees from the scale provided on the head.
5. No more trouble or time wasted getting the right clearance angle on the tough ones such as slab mills, **taper reamers**, angular cutters and form tools.
6. No more heat checking of cutters. One safe speed — 3600 RPM — for all wheels generally used on cutter grinders.
7. Quick, easy adjustment saves you time and money every time you grind a tool.

Ask us to send you complete
specifications including
price and delivery.

No. 118

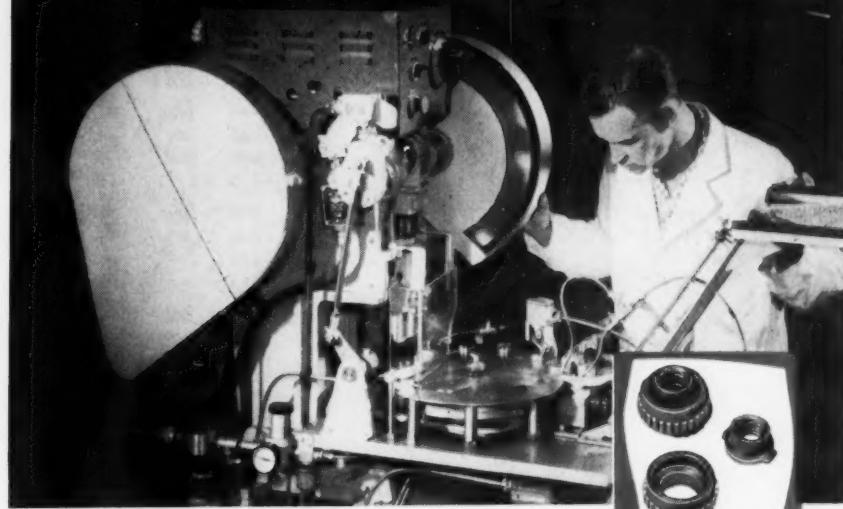
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PRECISION ANTI-FRICTION BEARING SPINDLES
FOR EVERY PURPOSE

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Fastener Production Increased 1150% with KENCO Electro-Safe Press



Rosan, Inc., of Newport Beach, California increased production of Floating Press Nut assemblies from 200 to 2500 per hour on a Kenco Electro-Safe Press. Formerly done on hand-fed presses, the improved setup employs a standard model Electro-Safe Press on which completely automatic tooling is mounted.

The problem was to join two components from automatic hopper feeds in exact orientation for assembly on a dial feed mechanism. An Electro-Safe Press was selected because its controls are specifically designed for simple interlocking of checking and safety devices which monitor proper function at critical stations.

Electro-Safe Presses are equipped with built-in controls especially suited for multi-press setups or use with automatic tooling to effect large production increases and cost reductions. Write for free literature.



Write for—Kenco 4 Page Electro-Safe Bulletin Containing Specifications and Dimensions on 5, 8 and 15 ton Presses, 6 Models. Shows Standards, Deep Throat and Special 3 and 5 Multi-press set-ups.



THE MOST COMPLETE LINE OF SMALL PUNCH PRESSES IN THE WORLD

For more data circle 322 on Postpaid Card

Kenco 8 ton Electro-Safe Press is tooled to produce 2500 Nut assemblies (inset) per hr. automatically.

Job Facts

Company—Rosan, Inc. Newport Beach, California

Equipment—Kenco 8 ton Electro-Safe Press with 12 station Dial Feed. 2" press stroke at 50 st. per m.

Former Method—Hand Feed Presses

Former Production—200 pcs/hr.

Present Production—2500 pcs/hr.

Production Increase—1150%



Free Press Tonnage
Calculator—Fast, easy
to use. Gives press
tonnage for various
jobs. Complete instructions. Write
Kenco.

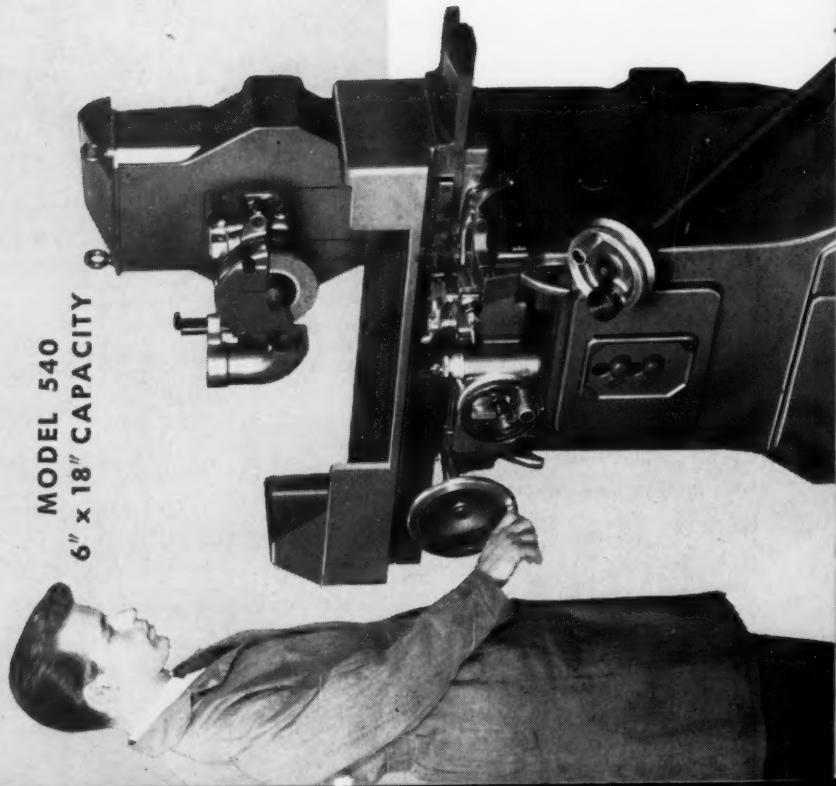
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HYDRAULIC SURFACE GRINDER

MODEL 540
6" x 18" CAPACITY



ACCURACY . . .
EFFICIENCY . . .
EASE OF OPERATION

This machine has all the essential qualities required to provide high caliber surface grinding. Its simplicity of design provides ease of operation while inherent accuracy and efficiency assure excellent grinding performance. Thousands of these grinders have been purchased by discerning

Users in every part of the world.



FEATURES:

- Completely centralized controls within easy reach of operator.
- Patented low-pressure, long-life Hydraulic System operating from self-contained motor-driven pump unit.
- Table traverse rates variable from 5' to 40' per minute. Smooth and shockless reversing at maximum speeds.
- Cross-feed automatically variable from .01 in. to .07 in. per stroke.
- Hand controls provided for both traverse and cross-feed. Micrometer adjustment to cross-feed in .0001 in. divisions.
- Vertical adjustment of wheelhead controlled by conveniently placed handwheel having a micrometer knob adjustment in .0001 in. divisions.
- Wheelhead slide operates on ball bearing rollers running on precision ground bars providing absolute sensitivity of vertical feed.

Automatic vertical wheelhead feed and electric lift can be fitted to standard machine as an extra feature. Also, numerous other attachments including form tool grinding equipment are available to assure full versatility.

FOR FURTHER INFORMATION, WRITE FOR YOUR COPY OF BULLETIN C183.



MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

HARDINGE
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of 1-1/16" or less diameter.

Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".

Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".



SPECIFICATIONS:
1½" Collet Capacity
9" Swing
17" Center Distance
Infinitely Variable Speed
230-3500 r.p.m.

HARDINGE

DOVETAIL BED

HARDENED
AND
GROUND STEEL

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results.

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"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

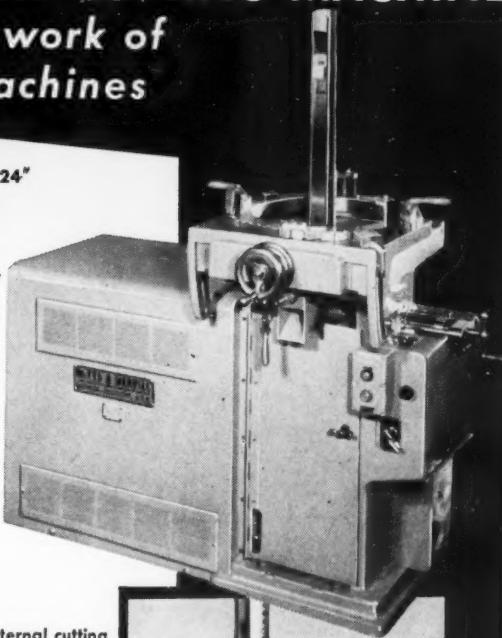
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**AMAZING NEW
HYDRAULIC
AND VERTICAL CUTTING MACHINE**

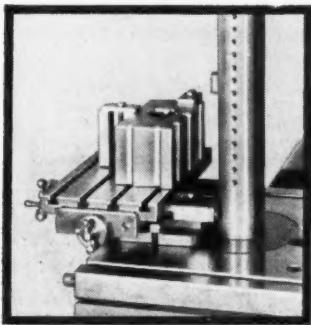
*does the work of
many machines*

In addition to a keyseater that cuts internal keyways up to 3" wide x 24" long, the new hydraulic M & M is a handy tool room machine and can be easily adapted to special production jobs other than keyways.

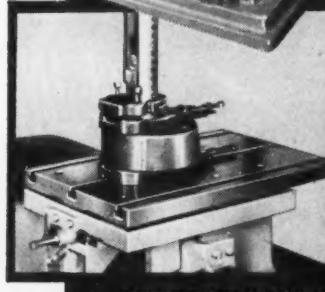
A wide variety of internal or external cuts, serrations, grooves and teeth can be rapidly made on this machine. With a combination tilting table and index table (shown on machine at right) straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle. Send us prints of your cutting problems.



Right: Set-up for internal cutting
Below: Set-up for external cutting



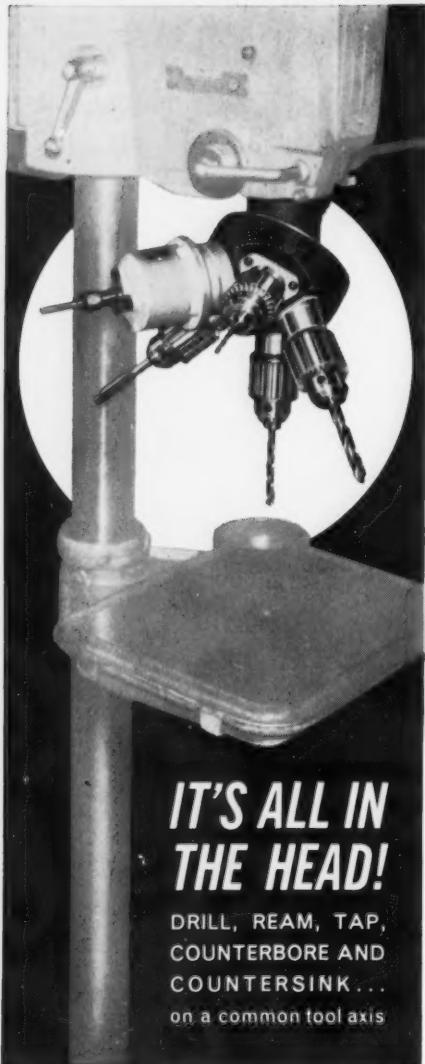
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BUILDERS OF MACHINERY
SINCE 1854

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VERTICAL CUTTING MACHINES**

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5 Spindle Model Shown

... CONVERT YOUR DRILL PRESSES INTO PRECISION
TURRET DRILLING MACHINES WITH...

QUADRILL
4 & 5 SPINDLE
TURRET
DRILLING
HEADS

- Save up to 70% in direct labor costs!
- Fast manual indexing
- Quadrill Turret Heads make it possible for one drill press to do the work of 4 or 5 single spindle drills, with a corresponding saving in floor space . . . save up to 350% in capital equipment costs!
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- Models available for all standard drill presses.

Quadrill Turret Drilling Heads are proven in industry throughout the world for over 15 years . . . in companies such as Westinghouse, Chrysler, Bendix, General Electric, Douglas Aviation, Boeing and many others.

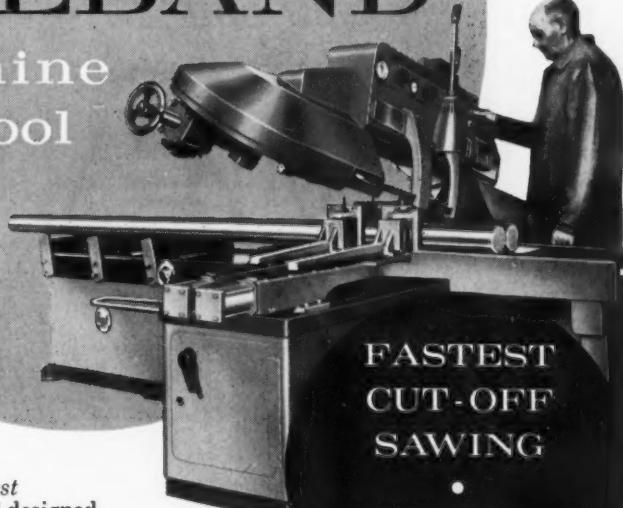
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FASTEST
CUT-OFF
SAWING

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Lowest Cost-
Per-Cut

Here's the *first* machine tool designed and built from the bottom up to provide the extra ruggedness and rigidity needed to handle high speed steel band blades with full efficiency. Cuts many times faster than other cut-off methods. Cuts *consistently* straighter, smoother, more accurately and to closer tolerances. Fully automatic operation gives you more pieces per man-machine hour. Narrower kerf with less chip loss means big savings in material.

GET THE COMPLETE TIME-AND MONEY SAVING FACTS NOW . . . write today for your free copy of Circular No. 502-59, containing full data on the new Milband Machine Tool.



THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 80 Years
CHAPEL & WILL STS., NEW HAVEN 5, CONN.

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A full line of Besly carbide tools with Kennametal material
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You've never had better carbide tool news than this . . . that your local Besly stocking distributor can now supply Besly Carbide Tools with Kennametal material, the prestige brand of carbide. Besly-Welles Corporation is headquarters for a full line of carbide single-point tools, blanks, indexable inserts and holders using Kennametal.

For full information on Besly Carbide Tools, and the name of your local Besly distributor, write today for this comprehensive catalog and price list of Besly Carbide Tools using Kennametal material.



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Tool Bits • Gages • Carbide Tipped Tools, Blanks, Inserts and Holders

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February, 1960

MODERN MACHINE SHOP 23

HE WON'T BE BACK HERE FOR QUITE A WHILE *

TOOL CRIB



* It's an

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APEX NUT RUNNING TOOLS —

Catalog 30-A — $\frac{1}{4}$ " to $\frac{5}{8}$ " square, hex drives

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NEW

AN EXCEPTIONAL DEVELOPMENT IN THE COMPOUNDING OF RUBBER CUSHIONED ABRASIVES

Semi-Firm Binder **Brightboy GB**

REG. U. S. PAT. OFF.

The addition of the Semi-Firm GB Binder to the Brightboy Line introduces new, time-saving rubber-cushioned abrasive compounds of inimitable formulation and unusual versatility.

GB rounds out the Brightboy line—the only complete, comprehensive STOCK LINE of multi-use rubber-bonded abrasives. Wheels, sticks, rods and blocks for machine and manual operations bring a wide, revolutionary concept to finishing—work saving applications not previously associated with abrasive uses.

With the introduction of the new Semi-Firm GB Binder, the Brightboy line now consists of FOUR BASIC RUBBER-CUSHIONED BINDER GROUPS: ST, Soft; GB, Semi-Firm; BL, Firm; TT, Tough. New GB combines the advantages of the Soft ST Binder with the durability of the Firm BL. Each of these four basic groups is made in an extensive range of Aluminum Oxide and Silicon Carbide abrasive grains. An additional binder, Fine-Tex, is compounded with pumice abrasive. All are available from STOCK.

You may have employed other methods or products in an endeavor to obtain the results which can now be achieved by new Semi-Firm Binder GB or other Brightboy Abrasives. Benefit from the new GB Binder—or the other Brightboy Binders. All JOB-MATCHED to your production in speeds and strength.



WRITE TODAY FOR

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- APPLICATIONS, MACHINE SPEEDS
- SAMPLE HAND TABLET
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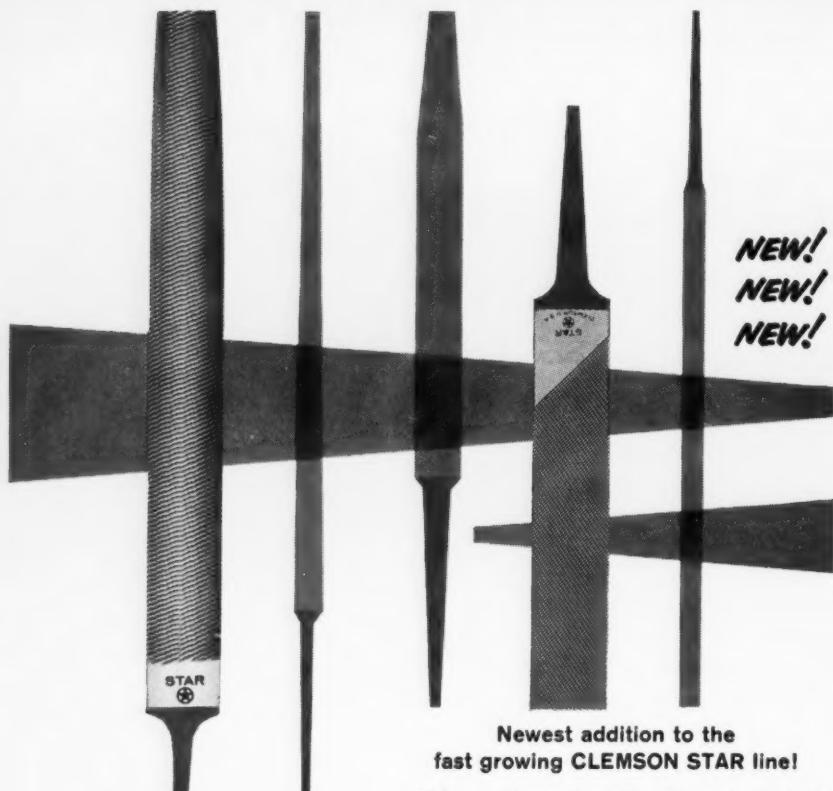
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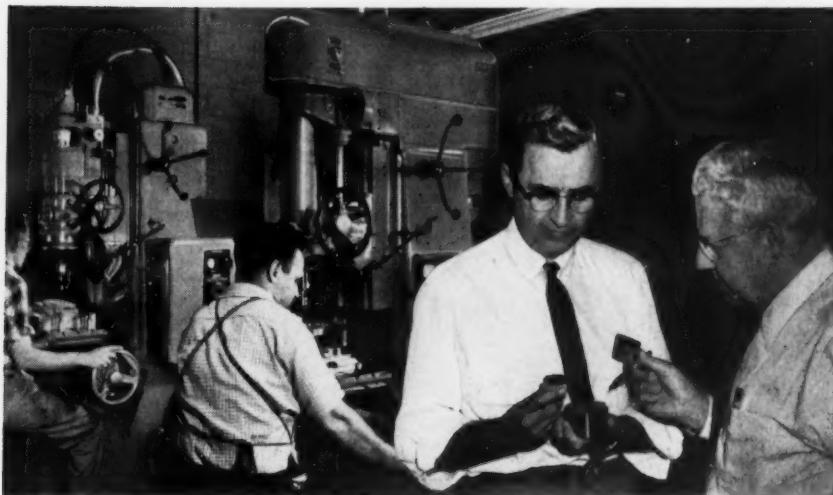
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METAL CUTTING PRODUCTS

POWER HACK SAW BLADES • HAND HACK SAW BLADES • HACK SAW FRAMES
BAND SAW BLADES • HOLE SAW BLADES • FILES • CLEMSON HAND MOWERS



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Herbert Harig, president, and Karl Harig, chairman, Harig Manufacturing Corporation, Chicago, examine tenth-splitting accuracy from their No. 3 Moore Jig Grinder (left) and No. 3 Moore Jig Borer.



"We're now splitting tenths, thanks to Moore's new No. 3 Jig Borer and Jig Grinder"



Made and calibrated
to the New International Inch.

"Our operators feel these are the best machines they have ever worked on... They take care of the tenth-splitting tolerances required by industry today."

These are the words of two of America's acknowledged tooling leaders, active heads of one of America's foremost independent producers of accurate dies—carbide, lamination, progressive, and other precision tooling.

Says Herb Harig, president of Harig Manufacturing Corporation and former president of National Tool & Die Manufacturers Association: "Moore's line of Jig Borers and Jig Grinders has been an integral part of the development of our company from 15 employees in 1937 to 120 today. We have always been among the first to install each new model. That's why we are among the first with Moore's tenth-splitting No. 3 Jig Borer and No. 3 Jig Grinder. Over the years we have en-

larged our Moore Jig Boring and Jig Grinding Department to 15 machines!"

Sums up Chairman Karl Harig: "When owner-management invests its money in machinery, it does so only after thorough analysis and careful selection. I don't know of any machine manufacturer which meets both these tests better than does Moore."

We stand ready to help you duplicate Harig's record of satisfaction. As a start, write today for our detailed literature on these new tenth-splitting machines with larger tables; hardened, ground and lapped ways; no gibs, no overhang.

MOORE SPECIAL TOOL COMPANY, INC.
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MARVEL GUIDANCE SYSTEM*

...SECRET
of
SAWING
ACCURACY



A new MARVEL invention—the "Sure-Line" Automatic Blade Controller—at last attacks the problem of maintaining accuracy in high speed band sawing.

This simple, but effective electro-mechanical guidance system invented and developed by MARVEL, actually "steers" a band blade while it is cutting, to maintain a straight path!

Designed as an integral part of, and available only in the new MARVEL 81 Series All Hydraulic Band Saws, the "Sure-Line" guidance system continuously senses and automatically corrects any tendency of a band blade to cut inaccurately. Now—with the MARVEL "Sure-Line" guidance system, every square inch of cutting life is squeezed out of each blade. The result: longer blade life, and cutting costs lowered to a point that makes high speed production cutting-off with a band saw economically practical.

A demonstration of the new MARVEL No. 81 All Hydraulic Band Saw will prove it. Write today for the complete story, and ask about a demonstration.

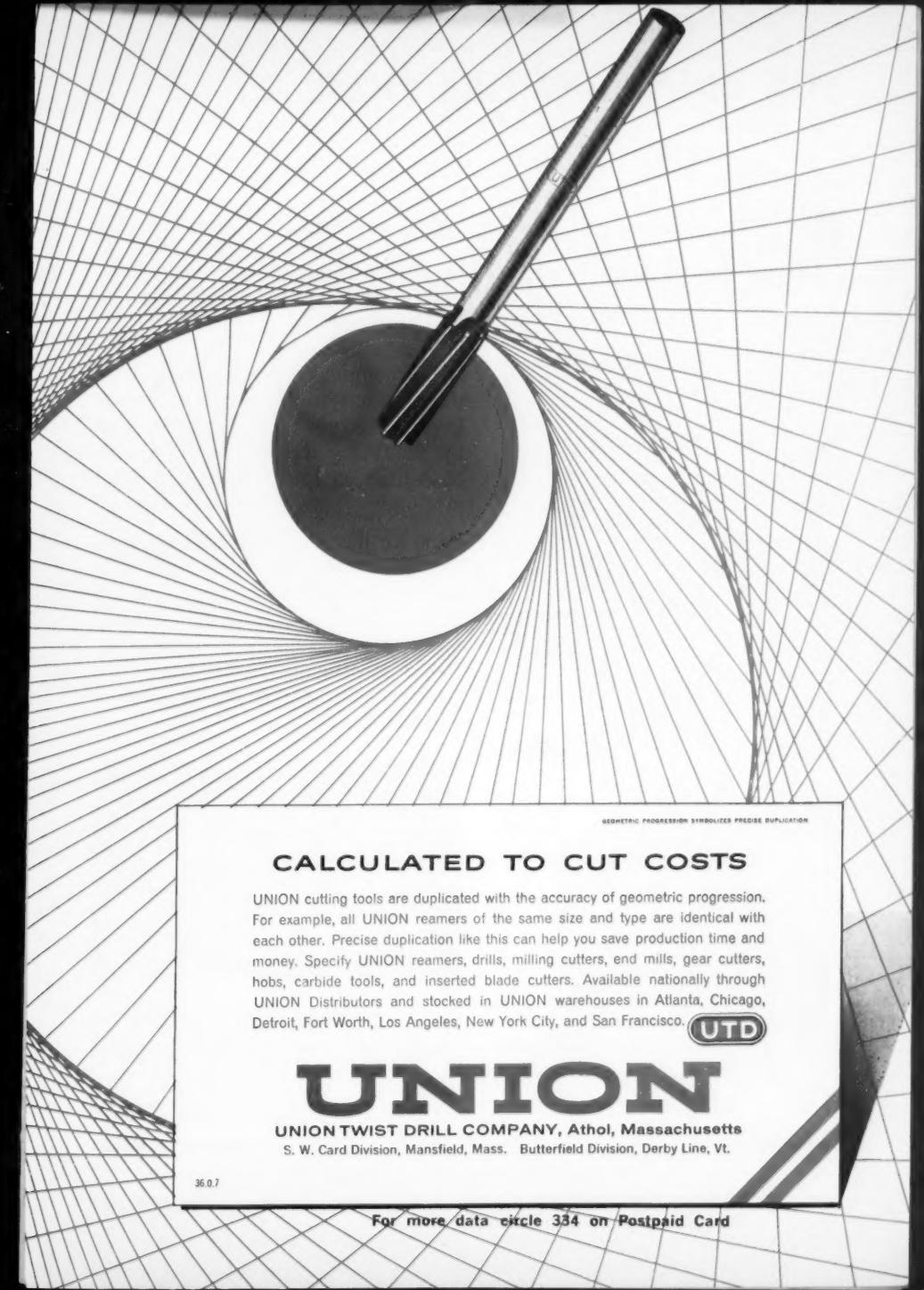
*SURE-LINE AUTOMATIC BLADE CONTROLLER (BASIC PATENT APPLIED FOR)

ARMSTRONG-BLUM MFG. CO. 5700 W. BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

MMT-PE

MARVEL Metal Cutting
SAWS
Better Machines. Better Work.

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GEOMETRIC PROGRESSION SYMBOLIZES PRECISE DUPLICATION

CALCULATED TO CUT COSTS

UNION cutting tools are duplicated with the accuracy of geometric progression. For example, all UNION reamers of the same size and type are identical with each other. Precise duplication like this can help you save production time and money. Specify UNION reamers, drills, milling cutters, end mills, gear cutters, hobs, carbide tools, and inserted blade cutters. Available nationally through UNION Distributors and stocked in UNION warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City, and San Francisco.



UNION

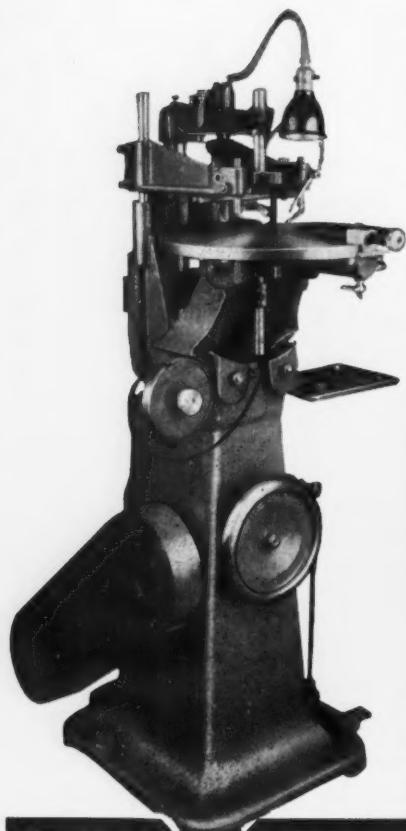
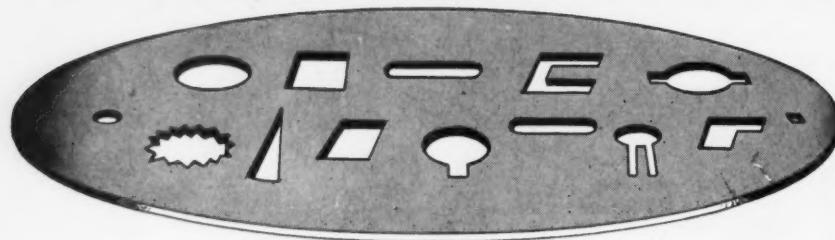
UNION TWIST DRILL COMPANY, Athol, Massachusetts

S. W. Card Division, Mansfield, Mass. Butterfield Division, Derby Line, Vt.

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Parts for jigs and fixtures, dies, gages, templates and special machine production can be shaped to dimension faster — easier — at less cost. No hand filing or semi-finishing operations. Better investigate Oliver today. Just write. Available in five sizes — bench or pedestal.



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Quickly measures transparent or opaque objects of any contour. Linear, accurate to 0.0001"; angular, to 1 minute of arc.



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Magnified 3-D views of tiny parts. Dustproof, shockproof, can be mounted right in machine or fixture. Speeds assembly, inspection. Most complete line, widest field of view.



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Positions small parts for critical measurement with B&L Bench Comparator and Toolmakers' Microscope. Auxiliary base, with 7" travel, increases range beyond that of measuring stage.



BENCH COMPARATOR

Exclusive under-stage illumination—no complex set-ups, no holding fixtures for most work. Magnified silhouettes, show errors instantly. Reads to 0.0001" with optional micrometer stage.



NEW SCRATCH-DEPTH GAGE

With this simple hand-held instrument you can measure the depth of any scratch to 0.0001", with a range of 0" to 0.015".

BAUSCH & LOMB

SINCE 1851

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INSPECTION
in FABRICATION
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OPTICAL AIDS CATALOG

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Please send literature on optical production aids checked below:

- Toolmakers' Microscope Scratch-Depth Gage Bench Comparator Optical Aids Catalog StereoZoom* Microscopes Universal Staging Fixture.

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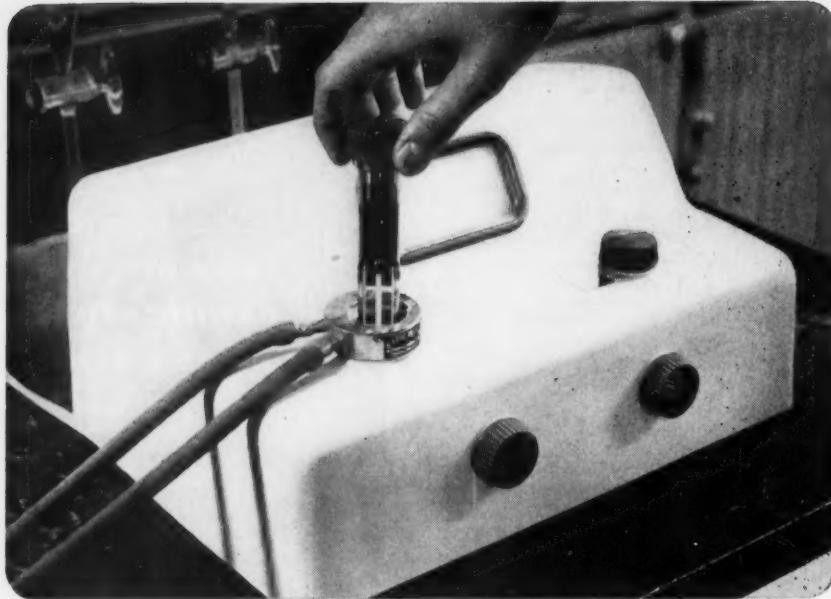
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City..... Zone..... State.....

Experience—the added alloy in Allegheny Ludlum tool steels



COLORIMETER (inherently extremely accurate) determines percentages of molybdenum, tungsten, cobalt and manganese in A-L tool steel to insure consistent, high quality.

Colorimeter measures exact chemical composition of Allegheny Ludlum tool steel melts

Accurate adjustment of alloys guarantees uniform heat treatment, predictable dimensional changes, reduced grinding, standardized machining operations.

Close control of molybdenum, tungsten, cobalt and manganese is at the heart of a good tool steel melt. In addition to the usual testing methods, Allegheny Ludlum's chemical laboratory checks these metals with Colorimetry because of its inherent, extreme accuracy.

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Colorimetry is but one step toward careful control over composition. Allegheny Ludlum also sets exacting purchasing specifications on raw materials and scrap. Quality Control checks all incoming orders to see that they conform with these specifications. Another guard toward your getting your exact specifications: each ingot bears a metal tab showing heat number.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

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Oliver Bldg., Pittsburgh 22, Pa. Address Dept. MS-26.**

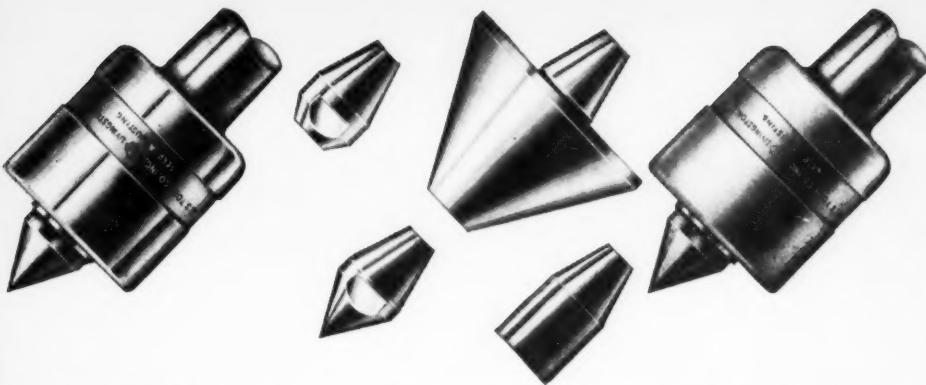
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Tool Steel warehouse stocks throughout the country...Check the yellow pages
every grade of tool steel...every help in using it



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Grinding Live Center

H.S.S. and Carbide
Accurate Detachable Points

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ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

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- Guaranteed one year.
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CLAMPS • NO-BEND MILLING ARBORS AND CLAMP/CUT MILLING VISES

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*end mills
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National offers you a complete line of job-proven end mills; there's one to meet your every possible requirement. And each one carries the built-in extras and added values that make National tools not just tools . . . but tools plus. With National tools you get *all* these important plus values:

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*you will save when you specify
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NATIONAL TWIST DRILL & TOOL COMPANY, Rochester, Michigan, U.S.A.

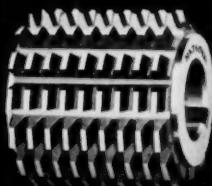
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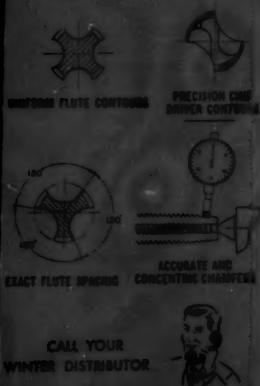


accurate and versatile



WINTER multi taps

WITH BALANCED ACTION



The Winter Multi Tap, as its name suggests, is a most versatile tool, effective for tapping annealed or soft aluminum, magnesium and stainless steel as well as some types of copper. And, of course Multi Taps are made with Winter's famous Balanced Action.

Extra manufacturing care is the ingredient that produces the exceptional accuracy and long life common to all Winter Balanced Action taps. Constantly increasing sales attest the ever-widening acceptance and popularity of these outstanding tools. You owe it to yourself to begin enjoying the benefits and savings that can be yours with Winter Balanced Action Multi Taps. Specify them next time you buy.

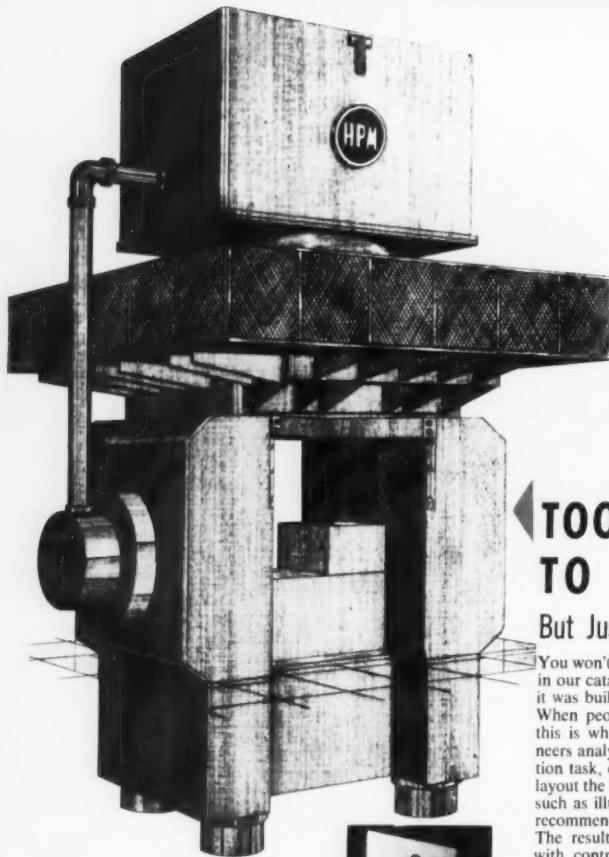
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HOW MODIFIED H-P-M STANDARDS TRIPLE
THE USEFULNESS OF METALWORKING PRESSES



From original design sketch to finished press, at right, H-P-M engineers apply the experience gained from literally hundreds of other "modified" standards. This press was expressly designed for high speed production of bar shapes, in refractory metals, carbides, etc. Force is infinitely variable up to 3000-ton downward with 1500-ton side action. A smaller internal ram provides separate action with over twice the speed for work less than 1200-tons.



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But Just Right For The Job

You won't find this 3000-ton H-P-M press in our catalog, but it fits the job for which it was built . . . like a glove. It's a typical. When people bring problems to H-P-M, this is what happens: Experienced engineers analyze every phase of your production task, establish the physical needs and layout the basic requirements in a machine such as illustrated. Standard elements are recommended in the majority of cases. The result — a standard press, modified with control and power essentials to fit your range of products exactly. *Special*, as required to handle your production problem with greatest efficiency; *standard*, to the extent that minimum engineering is required due to the hundreds of presses designed in the past for special requirements.

You're under no obligation if you ask the "why and how" of this specialized service. Write or call for complete details. See how better quality production can be planned more efficiently, at lower costs.

THE HYDRAULIC PRESS MANUFACTURING COMPANY
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36 MODERN MACHINE SHOP

February, 1960

new... low cost... for all vertical screw driving operations...

STRIPPIT ZIPP SCREW FEEDERS

save time... cut costs... reduce worker fatigue

save 2 to 25 seconds per piece per station — the new Strippit Zipp Screw Feeder completely eliminates production time lost in manual screw placement.

reduce errors and rejects — worker fatigue with its resulting loss of production efficiency is cut to an absolute minimum.

automatically feeds and drives all type screws — will feed and drive slotted, socket, clutch, hex or Phillips head screws even where clearances are extremely limited.

high efficiency, long run production — these units are particularly effective for the assembly of appliances, electronic and electrical components — and any operations requiring continuous vertical screw driving operations.

for all makes of air and electric tools — Zipp Screw Feeders are designed to fit perfectly on all makes of power screw drivers. They are factory set to fit your present or new equipment.

precision built for accurate operation — the screw holding collets of these machines are precision machined to hold screws accurately and firmly for finding screw holes. There are no delicate mechanisms to get out of order.

low cost, high speed, ease of operation — all contribute to production line economies that enable Strippit Zipp Screw Feeders to pay for themselves in from 30 to 120 days.

WRITE FOR FULL DETAILS — new illustrated literature, complete specifications, price and delivery.



STRIPPIT ZIPP SCREW FEEDERS MOUNT ANYWHERE — on a balancer, fixed position stand, kick press lift table, swing arm tool mount and numerous other ways to meet your individual requirements.



WALES STRIPPIT INC.

207 Buell Road • Akron, New York

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Yoder Rotary Slitters reduce inventory... speed production

To help meet the demands of tight production schedules, YODER Slitters reduce mill-width stock quickly and economically to desired widths. If your needs are as low as 100 tons per month, time and manpower savings alone will offset the cost of your YODER Slitter in a matter of months while reducing basic inventories. Compactly designed, standard YODER Slitters are built to handle standard coil widths...completely engineered lines for special requirements.

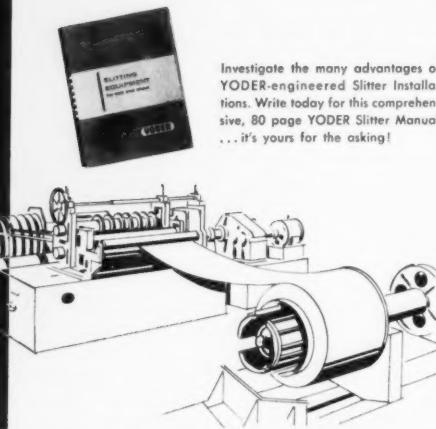
YODER accessories, such as coil cars, swivel unloaders, scrap choppers, scrap disposers, plate levelers and coil boxes, make stock handling fast and easy.

YODER also makes a complete line of Cold Roll-Forming equipment and Pipe and Tube Mills. To profit from YODER'S years of engineering and service experience, contact your local YODER representative or send for the YODER Slitter Manual.

THE YODER COMPANY

5555 Walworth Avenue • • Cleveland 1, Ohio

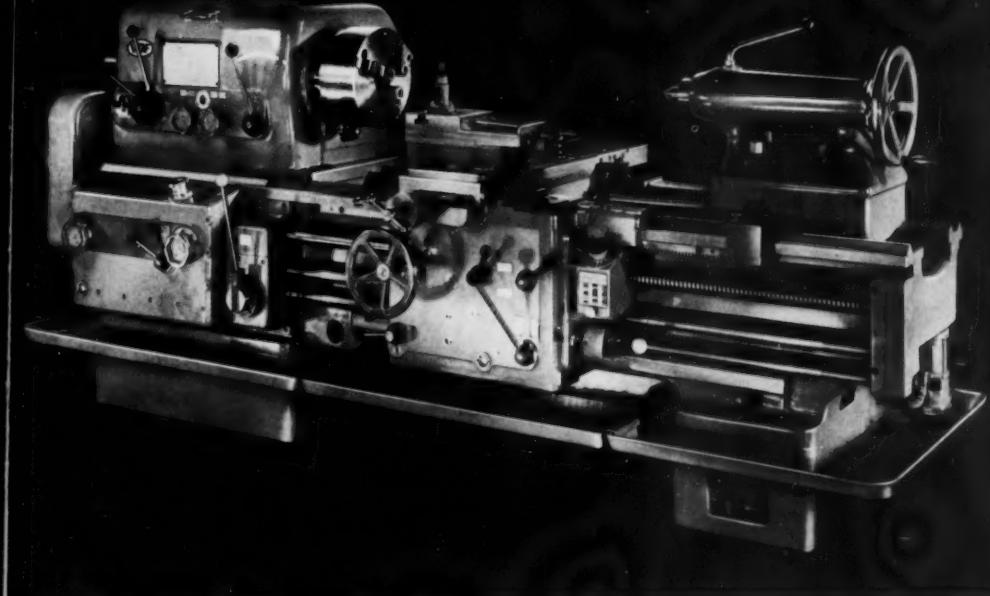
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ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES

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for quality, craftsmanship and economy

check these features of  **VDF LATHES**

- Wide, deep and diagonally braced bed ways for maximum rigidity under heavy cuts. *Bed ways induction hardened and ground.* Built-in oil pumps supply force-feed lubrication to headstock, apron and gear box.
- Anti-friction bearings in headstock and gear box—all headstock gears hardened and ground. *Totally enclosed, quick-change gear box* is dial type—cuts standard U.S.S. and metric threads without transposing gears. Headstock has Camlock spindle nose and electro magnetic spindle brake.
- Heavy duty box-type apron with single-lever longitudinal and cross-feed control has patented

drop worm drive that automatically trips feed when turning against dead stops. Multi-disc forward and reverse clutch can be controlled from the apron—and the headstock.

- Wide range of models—from 14-inch to 81-inch swing. *English screws and dials* are standard. Gap bed and bridge available.

VDF lathes, known the world over for superb quality and craftsmanship, are backed by complete engineering and service facilities. For more information write for Bulletin 127/1e.



VDF Lathe Division of **Rudel Machinery Co., Inc.**
165 MILL LANE, MOUNTAINSIDE, N.J.

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What's new in Hydraulic Presses?

you'll find it at Clearing

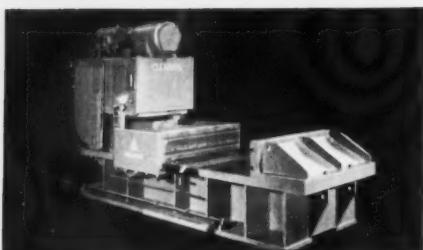


SHIP BUILDING — HEAVY PLATE HOT OR COLD FORMED.

Four separate ram actions on this 500 ton hydraulic flanging press simplifies plate fabrication.

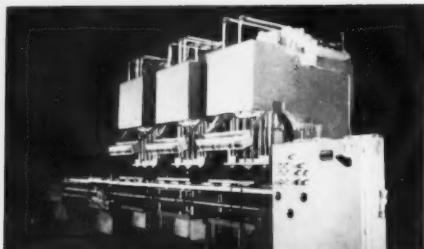
AUTOMOTIVE HARDWARE — FORMED AT HIGH SPEED.

Forty strokes per minute are available on this 500 ton housing type hydraulic press.



RAILROAD CAR PARTS — HOT OR COLD FORGED, FORMED OR STRAIGHTENED.

This 200 ton horizontal hydraulic bulldozer press lightens work of loading and unloading.



CO₂ TANKS — DEEP DRAWN.

Three hydraulic presses become a transfer feed line and operate at high speed to produce gas cylinders at 15 strokes per minute.

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LOWEST COST

*per drilled
hole...*

Two vital factors in drilling costs are Machine Investment and Operator Time . . . and CINCINNATI Customized Sliding Head Drills minimize both!

Your CINCINNATI is "tailored" to suit your type of work exactly. You buy only the cost-saving combination you need—minimum machine investment. You provide all the necessary time-saving equipment—the operator keeps the drill cutting more of the time.

And, these CINCINNATI Drills are *economy-priced!* The basic 24" machine with 6-speed vee-belt drive and hand feed—ideal for general purpose work—is only \$1090 . . . only \$975 for the 16" model.

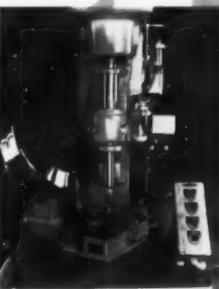
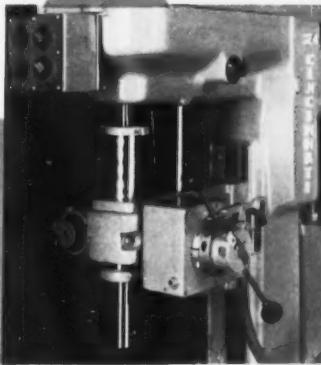
For toolroom work with many different hole diameters, the model shown at right above, has Infispeed variable speed drive and extra large work table.

If you do a lot of production drilling and tapping, you would want power feed with precision depth stop and feed disengage, and electrical tapping with automatic tap reversal, shown at right center.

Or, your CINCINNATI can provide a wide variety of economical automation, as in the fully automatic nut-tapping setup at lower right (only \$4,000).

These machines are built in medium duty 16" and 24" sizes with 1" capacity, heavy duty 21" and 25" sizes with 1½" capacity.

Ask your Cincinnati Lathe and Tool Dealer to recommend the exact machine for your jobs—or write to us direct.



CINCINNATI LATHE AND TOOL CO.

3207 Disney Street, Cincinnati 9, Ohio

"HYDRASHIFT" Lathes / "CINCINNATI" Drilling Machines / "SPIROPOINT" Drill Sharpeners





LOOK AT THE CAPACITY OF THIS 12" x 24"
Walker CERAMIC MAGNETIC CHUCK

Full 288 square inches of working surface on the all steel, silver brazed top plate. Powered by Ceramic Magnets with three times the coercive force of ordinary Alnico. $\frac{1}{4}$ " pole spacing . . . ideal for holding thin or small work. Chips and grit easily brushed off . . . constant redressing eliminated. Lower, too . . . $3\frac{3}{8}$ " for greater machine capacity. Walker Ceramic Magnetic Chucks are available down to 4" x 4" working surfaces. For complete details write: O. S. WALKER COMPANY, Worcester 6, Mass.

O.S.Walker

Original Designer and Builder of Magnetic Chucks

Ceramic Magnetic, Electric, Rotary, Vacuum Chucks — Demagnetizers

For more data circle 347 on Postpaid Card



Namco Collapsible Tap Passes Tough Test at TOWMOTOR...

"NO SPOILAGE PERMITTED"

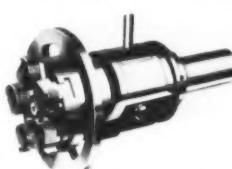
Because I.D. honing and other costly machining precedes internal tapping of outer jackets for hydraulic cylinders, Towmotor Corporation specified a Namco RST Collapsible Tap to insure "no spoilage" tapping. Supplied with a 5-chaser circular head and installed on existing turning equipment, the tap cuts perfect Class 2 threads . . . on every piece, meets Towmotor's rigid requirements with ease.

Namco Collapsible Taps can be used for long or short runs and on rotating or stationary spindle machines. Long life circular chasers can be ground to micrometer settings with cost-cutting consistency. They're adjustable to all diameters with a full range of sizes to meet your most demanding applications . . . 1 $\frac{1}{4}$ " to 7 $\frac{1}{2}$ "; 5" to 15 $\frac{1}{2}$ ".

Write for complete details on how Namco Collapsible Taps boost profits through better tapping.

For more data circle 348 on Postpaid Card

February, 1960



**National
Acme**

The National
Acme Company
183 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

MODERN MACHINE SHOP 43



CUSTOMER

THIS CERTIFIES THAT THERE IS ON

TOM RAGSDALE SAYS,

"I Make Money

L 315 723 349 A

On receipt of this advertisement,
before August 1, 1960,
the R. K. LeBlond Machine
Tool Co., Cincinnati 8, Ohio
will deliver a valuable and
useful article to the sender.



THOMAS A. RAGSDALE

Vice President, Ragsdale Bros. Tool & Die, Inc., Englewood, Colo.



THE R.K. LeBLOND

"Having a new LeBlond is better than having the cash." Call a LeBlond representative or ask a LeBlond owner.

TESTIMONIAL

DEPOSIT AT LEBLOND A LETTER WHICH READS . . .



With LeBlond Lathes"

"Tom Ragsdale tells me that his LeBlond Lathes give him a definite advantage over his competition. It's things like this that make me proud I sell LeBlonds."

A handwritten signature of R.E. Duboc.



R. E. DUBOC

President, R. E. Duboc Associates, Denver, Colo.

MACHINE TOOL COMPANY



The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio

For more data circle 349 on Postpaid Card



drill varied hole patterns without changing set-up

If your drilling, tapping, or milling jobs require even, uneven, or skip indexing, this new Electrodex table will give you more flexibility than ever.

Set up your work piece just once on this table, and you can drill many different hole patterns. Changeover from one index pattern to another is fast. You can do it mechanically—with index rings or inexpensive templates—

or by push-button electrical counting.

Eight-channel numerical tape control is available. You get indexing accuracy to $\pm .001"$ at a 45" diameter. And you can choose your table size from 30", 45", 60", and 80" diameters.

Bulletin 258 gives complete details.

Avey Division, The Motch & Merryweather Machinery Co., Box No. 1264, Cincinnati 1, Ohio.



For more data circle 350 on Postpaid Card

**GET TRUE READINGS
ON FINISHES
EVERYTIME, EVERYWHERE
WITH
SURFINDICATOR**

Job to job, plant to plant, *every* Brush Surfindicator gives true and identical readings from 0 to 1000 microinches on the same surface. Precision reference standard comes with every unit; makes field calibration simple and eliminates need for factory adjustment. The Surfindicator is immune to magnetic fields, vibration, line voltage variations; weighs but 15 pounds and is completely self-contained. **ONLY** Brush Surfindicator Complies Completely With ASA and MIL Specs. See For Yourself. Request A Demonstration.

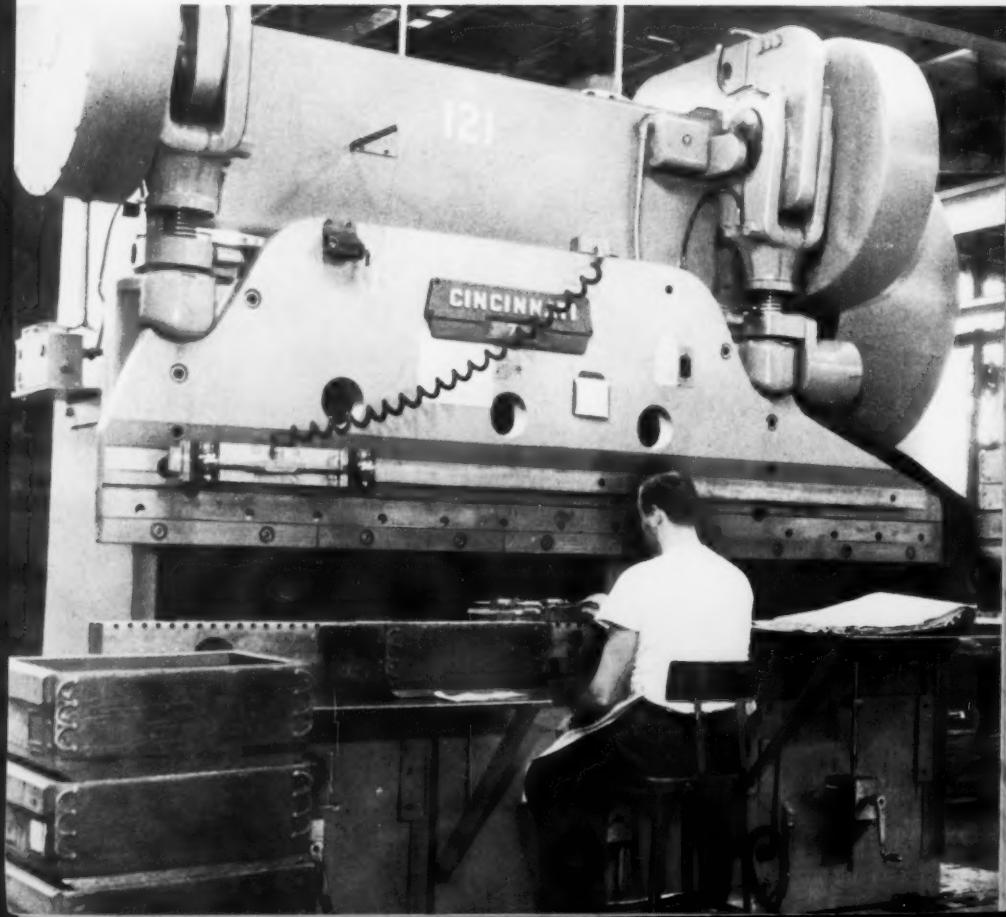
brush INSTRUMENTS
DIVISION OF
37TH AND PERKINS CLEVITE CORPORATION CLEVELAND 14, OHIO



Cincinnati® automatic cycle

Cincinnati Automatic Cycle Press Brake combines instantaneous fast and slow ram speeds with every stroke. This permits fast forming of long, flexible parts without "whip up" and "back bends." Also eliminates the need for an operator skilled at clutch slipping. "NCR" uses it to form parts for electronic business machines and computers.

Courtesy The National Cash Register Company



saves \$6900 on dies; stops "back bends"



The National Cash Register Company, Dayton, Ohio, has earned a healthy pay-off with this Cincinnati Automatic Cycle Press Brake. They have shrunk production costs in two ways:

- 1** On one part for a new electronic bank machine, they use simple press brake dies (costing about \$600) instead of conventional punch press dies (costing about \$7500). Similar savings are multiplied on 300 other parts formed on this machine.
- 2** They have eliminated "back bends" which damage large cabinet panels. This is a result of the Cincinnati Automatic Cycle—a feature you can't buy on any other press brake.

You can earn comparable savings in your shop with a Cincinnati Automatic Cycle Press Brake. Ask us to show you how.

Shapers / Shears / Press Brakes



THE **CINCINNATI**

SHAPER co.

Cincinnati 11, Ohio, U.S.A.

For more data circle 352 on Postpaid Card



There's a **WESPO** clamp or plier for
every clamping job!



80 models and sizes...

*made better three ways to
give more positive holding,
last longer!*

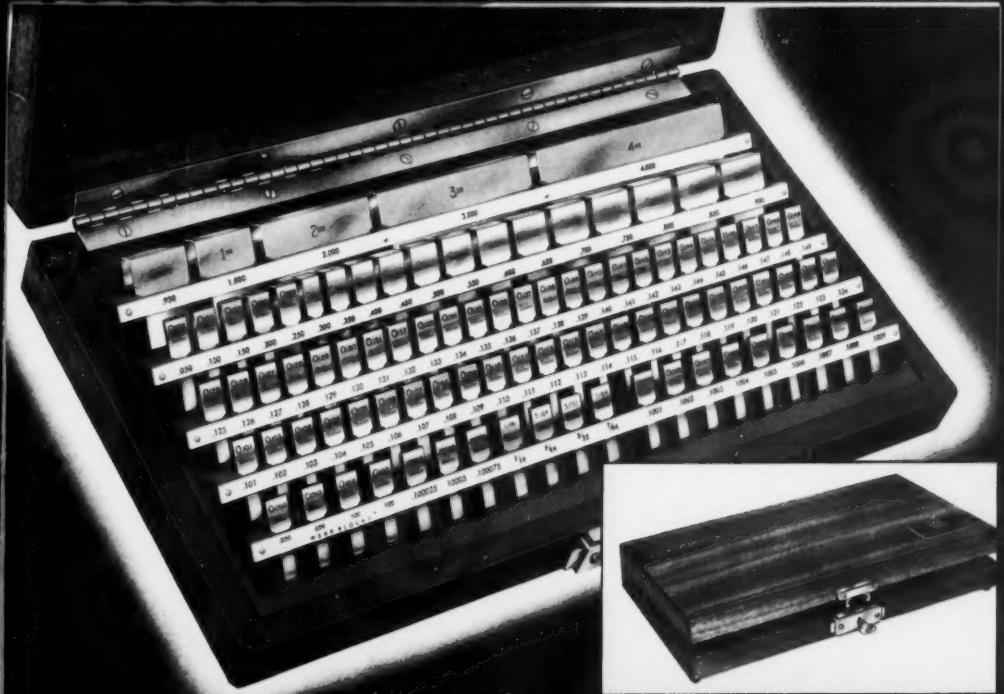
send for free catalogs describing Wespo clamps and fixture details



- 1 Reamed holes
- 2 Hardened serrated bushings
- 3 High tensile strength rivets

WESPO DIVISION
VLIER ENGINEERING CORPORATION
Formerly West Point Manufacturing Company
26935 W. Seven Mile Road • Detroit 19, Michigan

For more data circle 353 on Postpaid Card



THE CASE, also new and greatly improved, is made of finest quality, frosted, walnut grain Melamine, with Bakelite interior. (Patent pending.)

Weuser ANNOUNCES

A New Superior Gage Block, "A+" .000004
- .000002

Priced lower than former "A" and "B" sets.

These new blocks actually exceed U. S. Bureau of Standards or Federal specifications for Grade "A" blocks. Yet WEBBER has priced them even lower than now obsolete "B" blocks!

A COMPLETE \$ 287 50
84 block set only

including two .100 Croblox (chrome carbide) wear blocks.

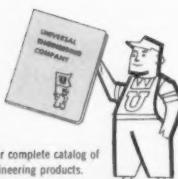
New, HIGHER Accuracy New, BETTER Case New, LOWER Prices

Don't wait! Write today direct to WEBBER for your free copy of folder describing this REVOLUTIONARY BUY.

Webber GAGE COMPANY 12899 Triskett Road
Cleveland 11, Ohio

I am an exclusive manufacturer of precision case blocks.

UNIVERSAL
KWIK-SWITCH
TOOL HOLDER
permits
tool changes
in ten seconds!



Write today for complete catalog of
Universal Engineering products.



UNIVERSAL CHUCKS

for every purpose



BORING CHUCK



STANDARD COLLET CHUCKS



FLOATING COLLET CHUCK

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 9, MICHIGAN

For more data circle 354 on Postpaid Card

Right before your eyes...

A 27% (or more) INCREASE
in LATHE PRODUCTIVITY!



Push-Button Zeroing . . . you're instantly and automatically ready to measure off the next distance.

The DISTOMETER, a totally new precision instrument, greatly increases lathe output . . .

Because —

- It provides a much faster, more convenient and more reliable means of spotting tool position and measuring longitudinal cutting distance than any other available device.
 - It has motorized, Push-Button Zeroing. Lets you reference instantly at any point in the carriage travel for continuous measurement to any other point.
 - It puts accurate, well magnified, man-size readings in front of the operator so he can follow progress of the tool and know instantly when it has covered the required distance.
 - It requires no set up, no positioning, no mastering. Ready to measure directly at the touch of a button.
- ANY MANUALLY OPERATED LATHE . . . OLD OR NEW . . . BIG OR SMALL . . . CAN USE THE DISTOMETER PROFITABLY!
Write for brochure.

FEDERAL PRODUCTS CORP.
6142 Eddy Street, Providence 1, R. I.

Ask **FEDERAL** First

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

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they're new!
VICTOR

Yellow Tang

quality files...

Latest Addition to the big VICTOR Line

What do you look for in a new product? Precision workmanship? Improved performance? Guaranteed dependability? An established brand name? You'll find all four in new VICTOR "YELLOW TANG" Files.

Individually checked and tested before they leave the factory, new "YELLOW TANG" quality files are the latest addition to the fast growing line of outstanding VICTOR metal cutting tools.

Your local authorized VICTOR distributor will gladly furnish you with detailed information on new "YELLOW TANG" Files. Contact him today. He's ideally equipped to fill all your cutting tool needs.

VICTOR
VICTOR Saw Works, Inc.
METAL CUTTING PRODUCTS
Middletown, N.Y.

© 1960

POWER HACK SAW BLADES
HAND HACK SAW BLADES
HACK SAW FRAMES
BAND SAW BLADES
HOLE SAW BLADES
FILES



For more data circle 356 on Postpaid Card

LOOK TO AMERICAN TOOLMAKERS FOR THE FINEST CUTTING TOOLS



Today's high speed steel tools for sawing, tapping, drilling, milling, broaching, reaming and other metal cutting operations are better than ever. Through research and development, and new and better production methods, American toolmakers are constantly improving high speed steel tools to help you make better products . . . at less cost.

As a leading producer of high speed and other specialty steels, Universal-Cyclops continues to aid your toolmaker's efforts with its own aggressive research and development program.

*Look to your American toolmaker
for the finest in
high speed steel cutting tools!*

CUTTING TOOLS
made from
HIGH SPEED
STEELS

*are
Better Than Ever*

UNIVERSAL
CYCLOPS
STEEL CORPORATION
BRIDGEVILLE, PA.

TOOL STEELS • STAINLESS STEELS • HIGH TEMPERATURE METALS

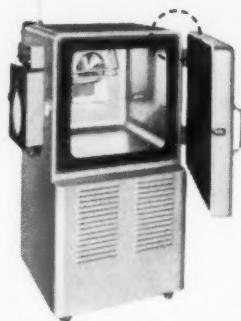
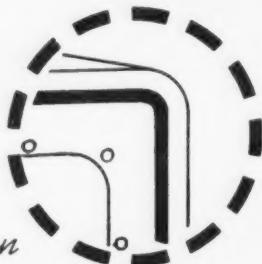
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CINCINNATI SUB-ZERO CHAMBERS feature **RUGGED CONSTRUCTION**

Cabinet heavily built to most exacting requirements . . . stands up to rigorous use . . . meeting the special needs of your industry with

Custom Engineered Design

- Rounded corners, for greater strength
- Unitized all-metal with no seams; electric welded
- "Toe-room" base, with skids or casters
- Phosphatized, to prevent rust
- Easily removable, expanded metal grille guards, for quick access to refrigeration system



For literature and estimates write



CINCINNATI SUB-ZERO PRODUCTS

General Offices & Plant
3930- S Reading Rd. • Cincinnati 29, Ohio

Representatives in major industrial areas
Member: Environmental Equipment Institute

For more data circle 358 on Postpaid Card

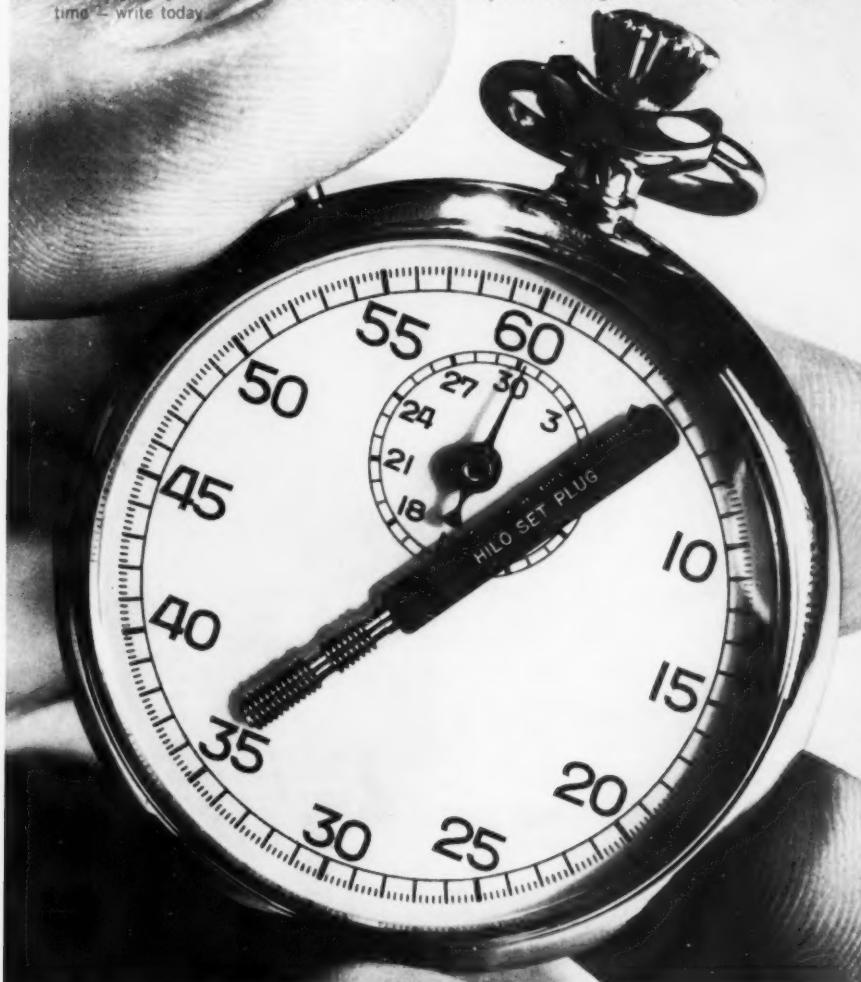
IN ONLY SECONDS YOU'RE SET WITH PIPE MACHINERY HILO PLUG GAGES

Here at last is a faster, more dependable method for setting ring gages and other adjustable instruments for the inspection of male threaded parts.

When set to the front portion, if the back portion stays out, the ring is in size. It's just that quick, just that certain!

In employing standard setting plugs, chances are it takes your operator unnecessary time to set a ring gage by the feel and shake method. With a new Hilo it takes only seconds and resetting is kept to a minimum.

For more complete information on how Pipe Machinery Hilo Set Plugs can save costly inspection time — write today.



THE PIPE MACHINERY COMPANY, 29100 Lakeland Boulevard • Wickliffe, Ohio • Greater Cleveland
For more data circle 359 on Postpaid Card



**How B&W JOB-MATCHED TUBING
helps you make a better product**

- ... The complete range of sizes and types of finish plus close tolerances provide freedom of design . . . *helps you make a better product*
- ... Quality controlled from start to finish helps provide a wide range of end use possibilities . . . *helps you make a better product*
- ... Controlled mechanical properties provide flexibility of design . . . *helps you make a better product*

These are just some of the reasons why it pays to specify B&W Job-Matched Tubing.

Call your local B&W District Sales Specialist, or write for Bulletin TB-361 for full information. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-9027-G3

B & W

**THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION**

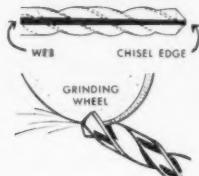
Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

For more data circle 360 on Postpaid Card

CLIP AND FILE

DRILLING TIPS YOU CAN USE

WEB THINNING IS IMPORTANT



Failure to thin the web is a common error in drill repointing. Most drills are made with webs that increase in thickness towards the shank. Always thin the web to its original thickness, using a machine whenever possible.

NEED A CHIP BREAKER?



There is a solution to the nuisance of long chips—a common problem in deep hole drilling. It is Chicago-Latrobe's "LO-TORK" Chip Breaker Drill. "LO-TORK" Drills have radically new flute contours that reduce chips to manageable size.

GOT A DRILLING PROBLEM?

Arrange a consultation with a Chicago-Latrobe Service Engineer. He can help you.

Best tip of all...

ASK YOUR
DISTRIBUTOR
FOR...



CHICAGO- LATROBE

DRILLS • REAMERS • END MILLS
COUNTERSINKS • COUNTERBORES
CARBIDE TOOLS • SPECIAL TOOLS and
exclusive "LO-TORK" CHIP BREAKER DRILLS



Write Chicago-Latrobe or call your distributor for
CATALOG No. 59. Sixty-eight pages of illustrated
listings and information—including prices.

CHICAGO-LATROBE

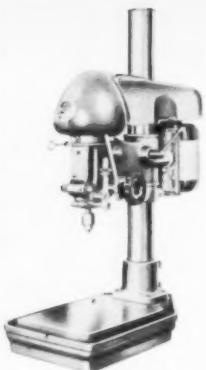
419 West Ontario Street

Chicago 10, Illinois

For more data circle 361 on Postpaid Card



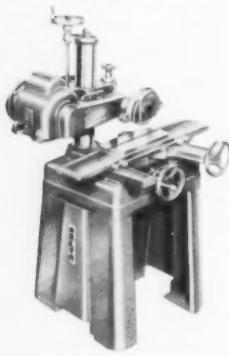
15" DRILL PRESS



14" SUPER-HI SENSITIVE



14" DRILL PRESS



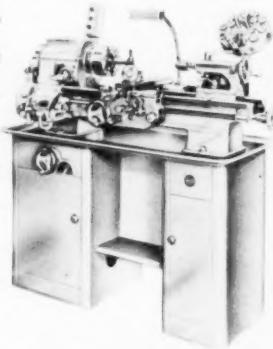
TOOLMAKER® GRINDER

Surface, Chipbreaker, Tool & Cutter



7" GRINDER

• Also 6" Tool Grinder, 6" Bench



11" METAL LATHE—4' and 5'

• Bed; Also Hand Screw Machine

DELTA INDUSTRIAL

a proved way to cut

You can match the tool to your job for bigger savings—supplement or replace expensive, special-purpose machines—when you choose from the world's most complete line—53 Delta machines, 246 models, over 1300 accessories. Delta tools cost less to buy, operate, and maintain. They offer precision performance to meet exacting requirements

even under rugged, production-line use.

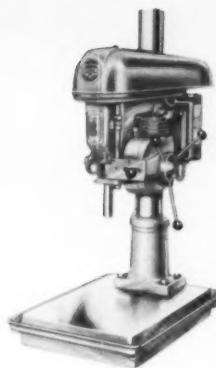
And because you can combine standard Delta components with automatic control devices, you can have the money-saving advantages of automation at a fraction of the usual cost. Ask your Delta Dealer about Delta "lo-cost automation"—he's listed under "TOOLS" in the Yellow Pages.



MULTIPLE SPINDLES



17" DRILL PRESS



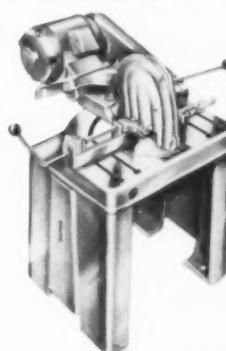
20" DRILL PRESS



14" METAL-WOOD BAND SAW
Also 14" and 20" Wood



6" ABRASIVE BELT FINISHER
Also 12" Disc, 2½" Belt Grinder



CUT-OFF MACHINE Wet & Dry
Abrasive, Non-Ferrous & Wood

PRODUCTION TOOLS

metalworking costs

FREE—Delta Industrial Catalog ... Get all the facts on the complete line of Delta metalworking and woodworking tools and accessories. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 6068 N. Lexington Avenue, Pittsburgh 8, Pennsylvania.



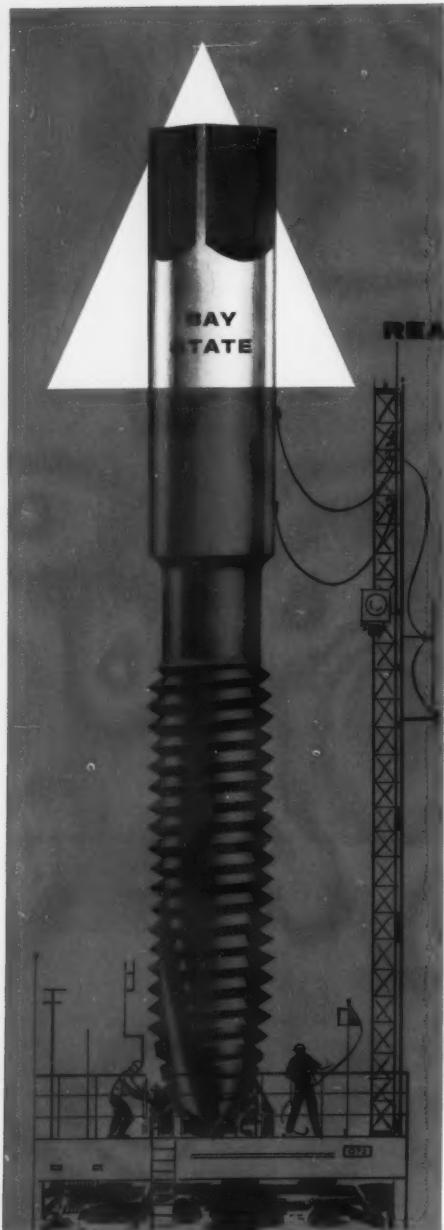
DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL



For more data circle 362 on Postpaid Card



READY FOR IMMEDIATE DELIVERY...

A Precision Tapping Performance

Bay State Announces New Sales and Service Facilities

8 New Stockrooms — *strategically located and fully stocked* — provide your distributor with immediate delivery of precision performance Bay State taps.

"Rapid Wire" electronic system assures up-to-the-minute communication between all stockrooms and factory.

Expanded staff of Bay State application engineers — tapping specialists provide undivided attention to your tapping problems.

Specifying Bay State taps results in *Immediate Delivery Of Precision Performance Tapping* from the nearby shelves of your Bay State Distributor.

BAY STATE TAP AND DIE COMPANY

1242 East 49th Street • Cleveland 14, Ohio

BAY STATE TAP AND DIE COMPANY

9 North Jefferson Street • Chicago 6, Illinois

BAY STATE TAP AND DIE COMPANY

20 Thomas Street • New York 7, New York

BAY STATE TAP AND DIE COMPANY

1853 Cheshire Bridge Road, N.E. • Atlanta 9, Georgia

BAY STATE TAP AND DIE COMPANY

2929 East Grand Boulevard • Detroit 2, Michigan

BAY STATE TAP AND DIE COMPANY

1902 North Field Street • Dallas 2, Texas

BAY STATE TAP AND DIE COMPANY

650 Howard Street • San Francisco 5, California

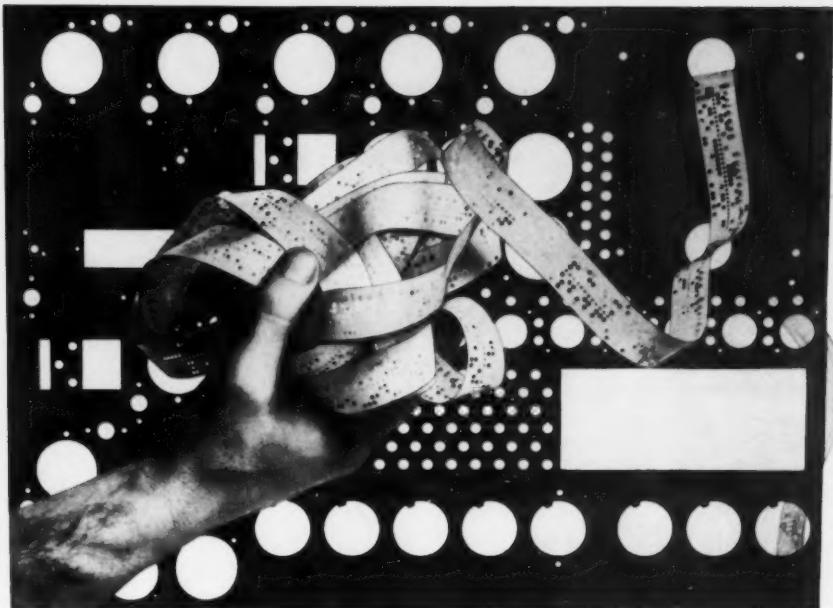
BAY STATE TAP AND DIE COMPANY

2301 East 38th Street • Los Angeles 58, California

BAY STATE TAPS

Bay State Tap & Die Company • Mansfield, Massachusetts

For more data circle 363 on Postpaid Card



A HANDFUL OF TAPE A HATFUL OF PROFITS

A Wiedematic gives you all the benefits of tape control plus the unmatched flexibility of a turret punch press for low, medium and high quantity production. Increased productivity is only a part of the story. The true value of Wiedematic is in major savings and increased efficiency all the way from drawing board to final assembly.

Such extra advantages as simplified engineering and work processing techniques . . . elimination of repeated blueprint interpretation . . . reduced inventory and many other cost cutting factors — these are only a few ways the Wiedematic will give you a hatful of profits.

Get full information. Write today for a bound copy of the Wiedematic story.

Wiedematic Turret Punch Presses are available in capacities from 15 to 150 tons



SEE WIEDEMATIC IN ACTION
BOOTH 1249
MACHINE TOOL EXPOSITION

**WIEDEMANN
MACHINE COMPANY
TURRET PUNCH PRESSES**

DEPT. MM-2 • GULPH ROAD • KING OF PRUSSIA, PA.

For more data circle 364 on Postpaid Card

**Why pay for "SPECIALS"
when you can get these
STANDARD BROACHES
from STOCK**

Minute Man

**KEYWAY
BROACH KIT**



In one minute and for as little as one cent you can cut a keyway with the Minute Man Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{3}{4}$ " to 3".

**SAVE TIME AND MONEY
WITH THESE OTHER STANDARD
STOCK BROACHES**

SQUARE BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes

HEXAGON BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes

ROUND BROACHES — $\frac{1}{4}$ " to 1" holes

**SEND FOR CATALOG
AND PRICE LIST**

**The duMont Corp.
Greenfield, Mass.**

MAIL FREE BROACH CATALOG AND
PRICE LIST S describing Square Broaches,
Hexagon Broaches, Production Type Keyway
Broaches and Keyway Broach Kits to

Name.....

Company.....

Address.....

duMont

For more data circle 365 on Postpaid Card

Meetings

Important Meeting Dates



FEBRUARY 4-5 • Alloy Casting Institute, Winter Meeting, Key Biscayne Hotel, Key Biscayne, Fla. Institute headquarters: 286 Old Country Rd., Mineola, New York.

FEBRUARY 14-18 • American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., Annual Meeting, Sheraton-Atlantic and Statler-Hilton Hotels, New York. Institute headquarters: 29 W. 39th St., New York 18, New York.

FEBRUARY 16-18 • Caster and Floor Truck Manufacturers Association, Annual Meeting, St. Moritz Hotel, New York. Association headquarters: 27 E. Monroe St., Chicago 3, Illinois.

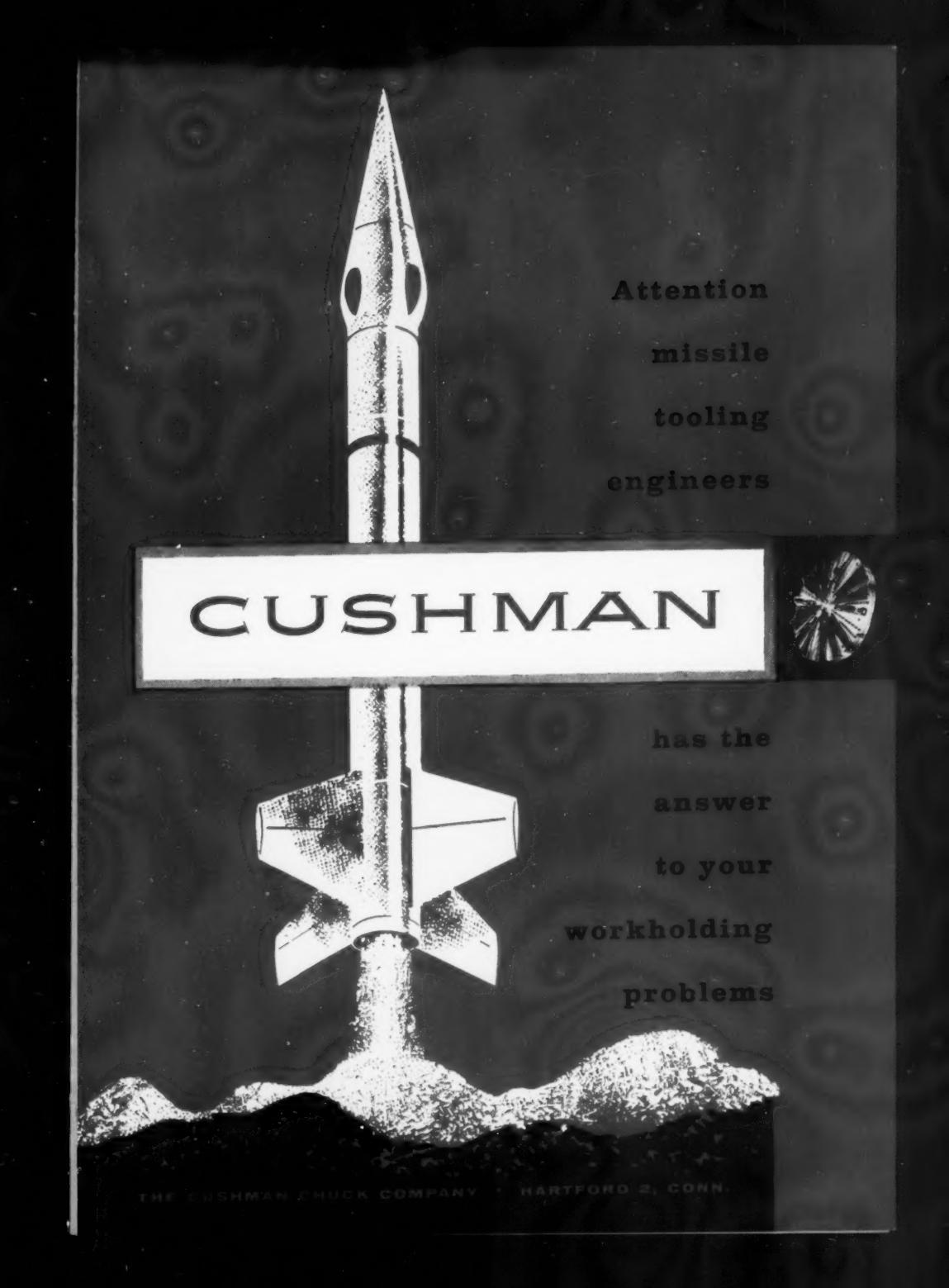
FEBRUARY 17-18 • Malleable Founders' Society, Technical and Operating Conference, Wade Park Manor, Cleveland. Society headquarters: 781 Union Commerce Bldg., Cleveland 14, Ohio.

FEBRUARY 24-27 • National Tool and Die Manufacturers Association, Winter Meeting, Roosevelt Hotel, New Orleans. Association headquarters: 907 Public Square Bldg., Cleveland 13, Ohio.

MARCH 7-8 • Steel Founders' Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

MARCH 14-18 • National Association of Corrosion Engineers, National Conference and Corrosion Show, Memorial Auditorium, Dallas. Association headquarters: 1061 M & M Bldg., Houston 2, Texas.

APRIL 21-28 • American Society of Tool Engineers, Industrial Exposition, Detroit Artillery Armory, Detroit. Society headquarters: 10700 Puritan Ave., Detroit 38, Michigan.



Attention
missile
tooling
engineers

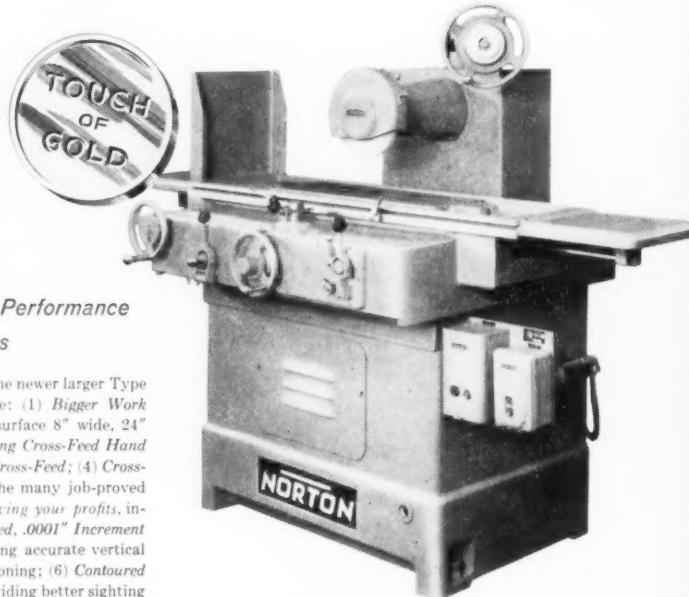
CUSHMAN



has the
answer
to your
workholding
problems

THE CUSHMAN CHUCK COMPANY • HARTFORD 2, CONN.

A big success...so...



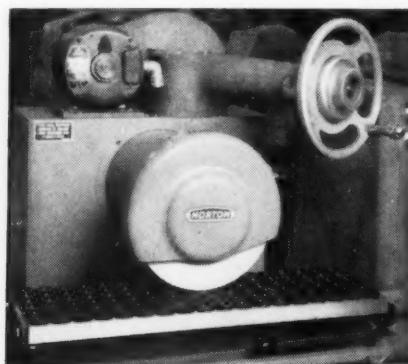
Bringing Top Performance to Larger Jobs

New additions to the newer larger Type S-3 grinder include: (1) *Bigger Work Table*, with work surface 8" wide, 24" long; (2) *Interlocking Cross-Feed Hand Wheel*; (3) *Power Cross-Feed*; (4) *Cross-Feed Stop Dogs*. The many job-proved features, *for improving your profits*, include: (5) *Two-Speed, .0001" Increment Hand Wheel* assuring accurate vertical feed and fast positioning; (6) *Contoured Splash Guards* providing better sighting and loading.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes



High-Grind Wheel Head Construction, provides 13½" vertical capacity from table top to bottom of standard 10" diameter grinding wheel, for handling tall workpieces.



125 Feet Per Minute is the Type S-3's high table speed that enables you to produce smoother plane surfaces, cut grinding time and increase production rate.

we're building it bigger!

Norton Type S-3 surface grinder...

with proved ability to finish

flat faster...

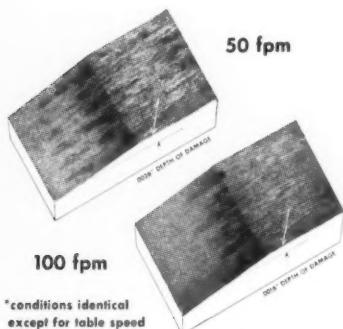
Now available

in 8" x 24" size

Performance of the new Norton 6" x 18" Type S-3 surface grinder for customers like these . . . Addressograph-Multigraph Corporation, Clevite Corporation, Cleveland Graphite Bronze Division, National Cash Register Company, The Timken Roller Bearing Company, Warner & Swasey Company . . . has made this larger size a necessity.

Besides a longer and wider work table, other design advancements enable this top-ranking surface grinder to finish bigger workpieces smoother, faster, at lower cost. Get the whole story from your Norton Sales Engineer, a trained specialist who can help you get better grinds for less money, or ask for our catalog 1982. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

MACHINE TOOL DIVISION: Grinding and Lapping Machines — G & E DIVISION: Shapers • Gear Cutting Machines • Gear Induction Hardeners



*conditions identical
except for table speed

Better Quality Work due to less heat damage with faster table speeds . . . at the same time greatly increasing the rate of stock removal.

For more data circle 367 on Postpaid Card

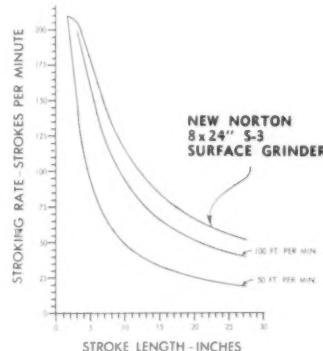
February, 1960

MODERN MACHINE SHOP 67



MACHINE TOOLS

75 years of... Making better products
...to make your products better



Calculate Your Savings from this Production Rate Chart. Grinding time is reduced in proportion to the increase in stroking rate.

NOW! YOU'RE PAYING FOR A *Robbins* **MAGNA-SINE**



YOU don't have a Magna-Sine? You're paying for one of these Robbins sine plates anyway! Why? Because angular setups on machining, grinding or inspection operations, which require hours by other methods, take just minutes with a Robbins Magna-Sine. The cost of lost man-hours on just a few angular setups in your shop would pay for one of these precision magnetic Magna-Sines or non-magnetic sine plates.

With this Robbins angular tooling equipment you can set up any angle in just four simple steps: (1) from "Table of Constants" furnished, find required angle; (2) select gage blocks indicated; (3) place blocks between sine plate base and bar swivel block; (4) secure work to sine plate—you're ready to grind, machine or inspect work.

Using Robbins precision sine plates is fast, simple and sure—you eliminate V-blocks, angle plates and complicated "build-ups". A complete range of models and sizes are available to meet the needs of any shop, large or small. You're paying for a Magna-Sine, you should have one.

Catalog MS-58 describes the complete line of Robbins Magna-Sines and non-magnetic sine plates, send for your free copy.

OMER E. ROBBINS COMPANY

J-6358

11961 Dixie Ave. Dept. B Detroit 39, Michigan

For more data circle 368 on Postpaid Card

ANOTHER "BUILDING BLOCK" BY

HARTFORD
Special

THE NEW Model 17-400



AIR HYDRAULIC DRILL UNIT

- 4" STROKE • UNITIZED • SMALL SIZE
- INTEGRAL AIR VALVE • FIELD TESTED

COMPLETE INFORMATION... on the new Model 17-400 Drill Unit, including dimensions, specifications and other engineering data, is covered in Circular No. GC-400. Write now for your free copy. The Hartford Special Machinery Co., 3700 Homestead Ave., Hartford 12, Conn.

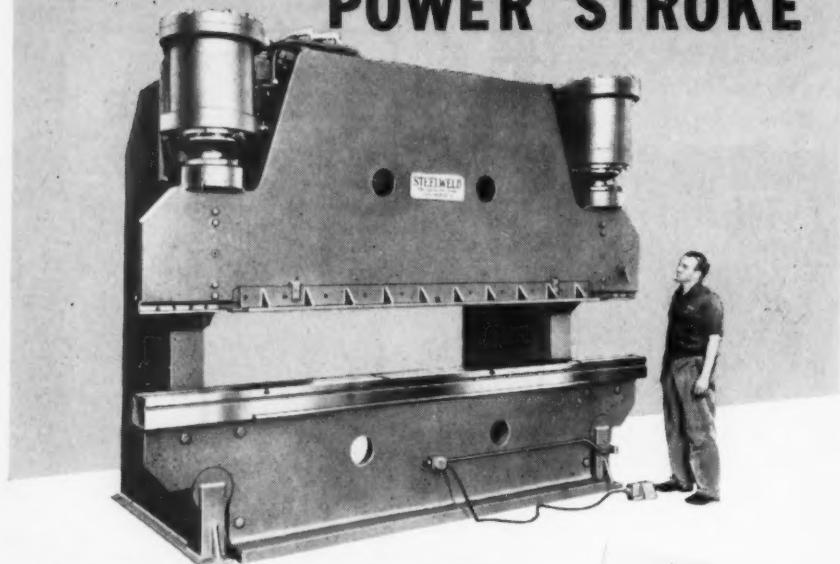


HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY COMPANY
HARTFORD 12, CONNECTICUT

For more data circle 369 on Postpaid Card

HYDRAULIC PRESS BRAKE with LONG CONSTANT POWER STROKE



Available in all capacities to 2000 tons.

Regardless of the depth of bend, the power applied to the ram of a Steelweld Hydraulic Press Brake is constant throughout for any length of stroke. This may be set at any amount by the pressure control.

The standard stroke varies from 12" to 18", depending on machine size, but longer strokes can readily be furnished for deep forming.

Get the details on the many fine features of these machines.

Ask for free Catalog No. 2024 ►

**STEELWELD MACHINERY DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
6477 EAST 281st STREET**

WICKLIFFE, OHIO

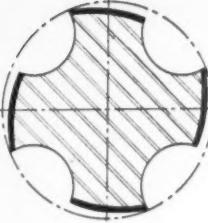
**STEELWELD HYDRAULIC AND
MECHANICAL PRESS BRAKES**

For more data circle 370 on Postpaid Card

COMPARE!

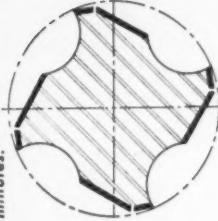
R-O RELIEF

Set-up time 5 minutes.
Grinding time 9 minutes.



ANGULAR RELIEF

Set-up time 10 minutes.
Grinding time 14 minutes.



RO
UNIVERSAL
FORM RELIEVING
FIXTURE

R-O Grinder

Royal Oak Tool and Machine Co.

GRINDER DIVISION
29800 Stephenson Hwy.
Royal Oak, Mich.

Please forward the R-O catalog

Firm.....

Address.....

City..... Zone..... State.....

Per.....

Title.....

For more data circle 371 on Postpaid Card

February, 1960

MODERN MACHINE SHOP

71

The savings on set-up and grinding time for one tool when done on the R-O may appear insignificant—but extend it for a volume run—multiply it by days—then add these other R-O advantages: (1) More cuts per grind (2) More grinds per tool (3) Better, cleaner cuts (4) Elimination of operations (5) Reduced inspection (6) Reduced scrap.

Compare R-O's many advantages over conventional sharpening methods—
Then get the R-O story. Send the coupon.

CASE HISTORY NO. 27—GROUND FLAT STOCK



Courtesy: Pittsburgh Tool Steel Wire Company

**Holds thickness tolerance to limit of .0005 in.
production-machining ground flat stock!**

Many people still think of surface grinding as a toolroom or finishing operation. But here's an example of Mattison Surface Grinders on high-production jobs also.

WARPLIS precision-ground flat stock, used in the manufacture of dies and precision machinery, is ground to a standard thickness tolerance of $\pm .001$ in. Many special jobs require a total tolerance to .0005 in.

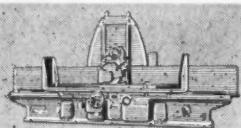
These tolerances are easy to hold on the "Mattison"—a machine that is built to

handle a wide variety of large or small parts at stock removal rates you never thought possible on a surface grinder. Shoulder and edgework are ground easily, interrupted surfaces are held to close tolerances due to adequate wheel clearance and spindle construction.

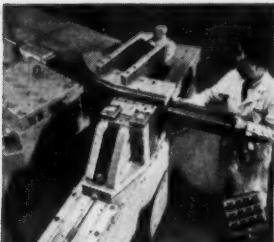
You'll be surprised at the number of jobs in your shop you can do faster and better with a "Mattison." Write for "Set-ups," a booklet describing the wide variety of jobs being ground in large and small shops.



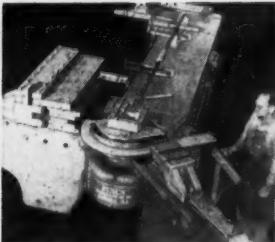
**High-Powered Precision
Surface Grinders**
MATTISON MACHINE WORKS
Rockford, Illinois, U.S.A.



For more data circle 372 on Postpaid Card



HEAVY RECTANGULAR TUBES—accurately formed on Pines Model 4 on a 24° inside radius for air cushion assembly on heavy duty truck chassis. Material is 4" x 5½" x .300" wall.



SOLID STEEL BEAMS—cold edge bending of 5½" x 1½" steel bars on Pines Model 4 replaces hot bending on ducer, produces more accurate parts at lower cost for road machinery manufacturer.

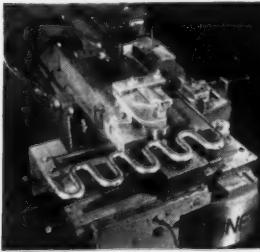


ALUMINUM CHANNELS—rugged machine construction and tooling on Pines Model 3 Machine cold forms 4" x 1½" x .390" aluminum channel without wrinkling or distorting. Spring-back is controlled by simple machine settings.

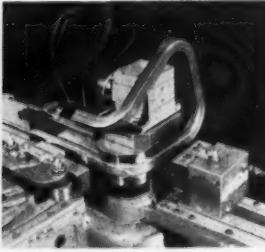
FOR COST CUTTING IDEAS

INVESTIGATE PRODUCTION BENDING THE "PINES-WAY"

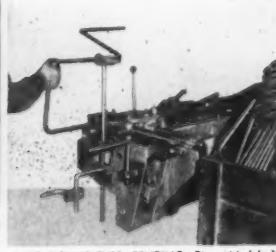
When you have a production job requiring the cold forming of parts from round, square, rectangular, extruded, or hollow stock to an even radius, or to different angles, we suggest you investigate the cost cutting advantages of production bending the Pines-way. The examples shown here illustrate a few of the many different and varied applications which are today profitably produced on Pines machines. Cold bending is a fast, accurate, easy to control metal forming process that is today more profitably applied in the production of an ever increasing variety of products. Call on Pines engineers for assistance without obligation on any specific job.



COPPER SERPENTINE BENDS—½" O.D. x .035" copper tubing is rapidly formed on this Model ½ into serpentine coils on a 1" cr. A simple gang-slitting operation produces 180° return bends.



WRINKLE-FREE SQUARE TUBE BENDING—Model 1 Machine, equipped with flexible mandrel and self-opening bending form, produces top quality office and hospital equipment at speeds of 250 bends per hour.



FAST ROUND-TUBE BENDING—Pines Model ¾ Machines speed production of tubular dinette and lawn furniture. Fast, automatic cycling and accurate progressive bending produce 600 to 900 bends per hour.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery 642 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY
For more data circle 373 on Postpaid Card

February, 1960

WRITE FOR FREE DATA SHEETS

To keep abreast with bending, write for free copies of "Pines News"—gives complete data on new production applications.



No Finer Equipment
FOR
MEASURING FLATNESS
EASIER . . . MORE ACCURATELY

LAPMASTER OPTICAL FLATS

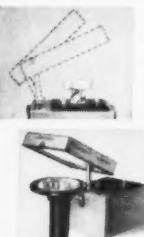
So accurate . . . so easy to get flatness readings down to 1/10 of a light band with the Lapmaster line of Optical Flats. Special manufacturing technique and laboratory control assures uniform flats of highest quality.

Available in certified optical accuracies of .000002" or .000001" . . . in either clear fused quartz or Pyrex glass . . . either double or single surfaced . . . in a full range of standard sizes from 1" through 12" dia.



**THE LAPMASTER
MONOCHROMATIC LIGHT**

There's no easier way to inspect and measure surface flatness. The new Lapmaster Monochromatic Light has a powerful helium lamp (40 candle power) for sharp reading . . . light head is adjustable for best reading angle; can be swung completely around to handle tall parts . . . is easily portable in self-contained carrying case.



Write for complete details and measurement chart.



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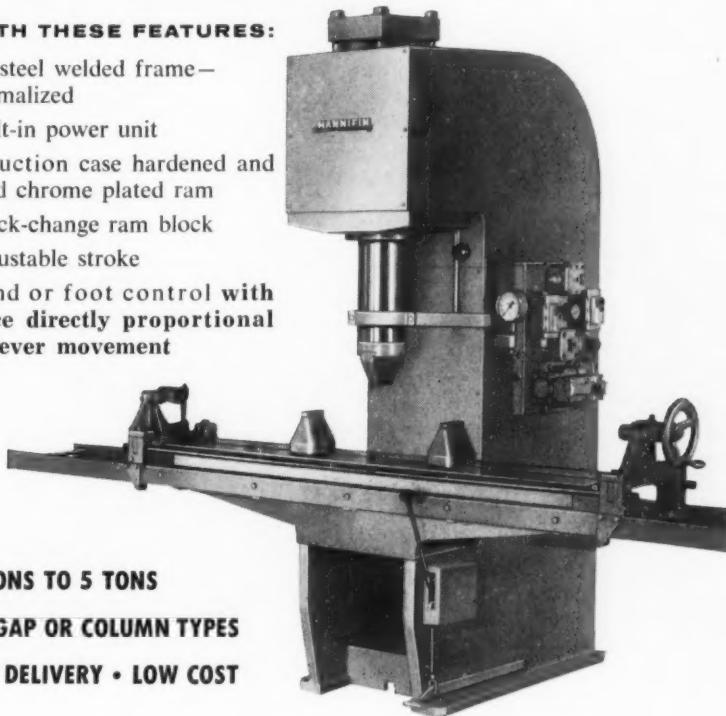
CRANE PACKING COMPANY
6418 OAKTON STREET
MORTON GROVE, ILLINOIS (Chicago Suburb)
In Canada:
Crane Packing Co., Ltd., Hamilton, Ont.

You get quick accuracy, more parts per hour
with Sensitive Pressure Control

exclusive on **HANNIFIN**
STRAIGHTENING PRESSES

WITH THESE FEATURES:

1. All-steel welded frame—normalized
2. Built-in power unit
3. Induction case hardened and hard chrome plated ram
4. Quick-change ram block
5. Adjustable stroke
6. Hand or foot control with force directly proportional to lever movement



150 TONS TO 5 TONS

OPEN GAP OR COLUMN TYPES

QUICK DELIVERY • LOW COST

You can straighten more parts, better, at lower cost with Hannifin presses. Ask your Hannifin man how—he's a trained production analyst. Or write for Bulletin 130-G . . . complete features and specifications.

HANNIFIN COMPANY

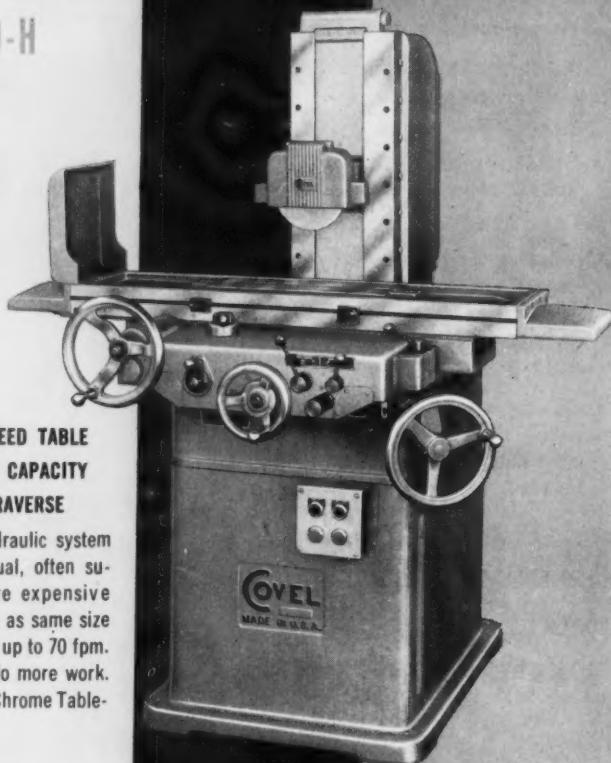
565 South Wolf Road • Des Plaines, Illinois

A DIVISION OF PARKER-HANNIFIN CORPORATION
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NEW HYDRAULIC

NO. 10-H

\$2,985
Complete



HYDRAULIC HIGH SPEED TABLE

BIG 16½" VERTICAL CAPACITY

HYDRAULIC RAPID TRAVERSE

Unique, simplified hydraulic system gives performance equal, often superior, to much more expensive grinders. Twice as fast as same size hand-feed machines — up to 70 fpm. Big capacity lets you do more work. Power Elevation, Hard Chrome Tableways at extra cost.

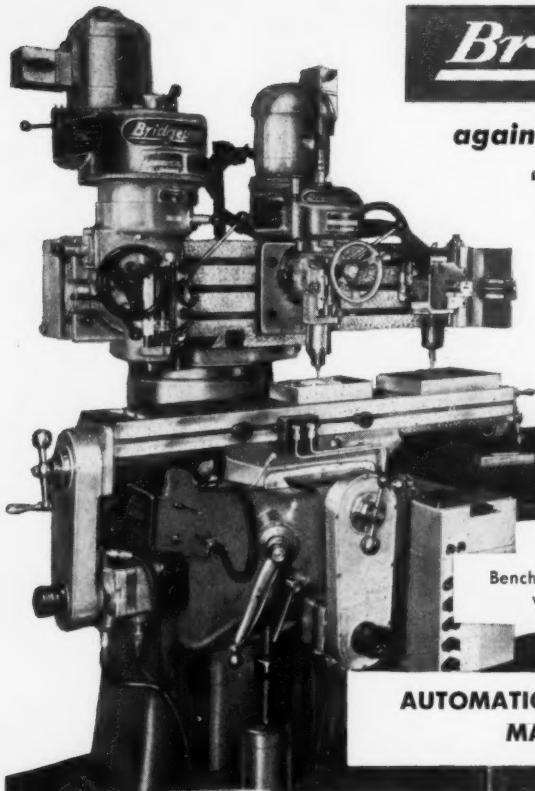


Micro-Precision a Covel Tradition -- Since 1874

**PRECISION
GRINDERS**

Write, wire or call TODAY for complete information and prices on the 10-H and the complete line of Covel Precision Grinders. Ask for Bulletin M20.

For more data circle 376 on Postpaid Card

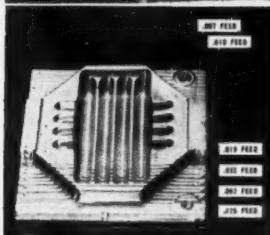


Bridgeport

again offers customers

**"THE MOST
FOR THE LEAST"**

**AUTOMATIC DUPLICATING
MACHINE**



Any degree of finish available by simple adjustment of pick feed.

**50% less time for
duplicating most parts**

Fully automatic . . . variable feed rates . . . Push Button rapid traverse . . . can be used as standard hand-operated machine . . . uniform cutting feed in any plane . . . pick feed in either direction. Conventional 180° die sinking for roughing . . . ways and screws chrome plated.

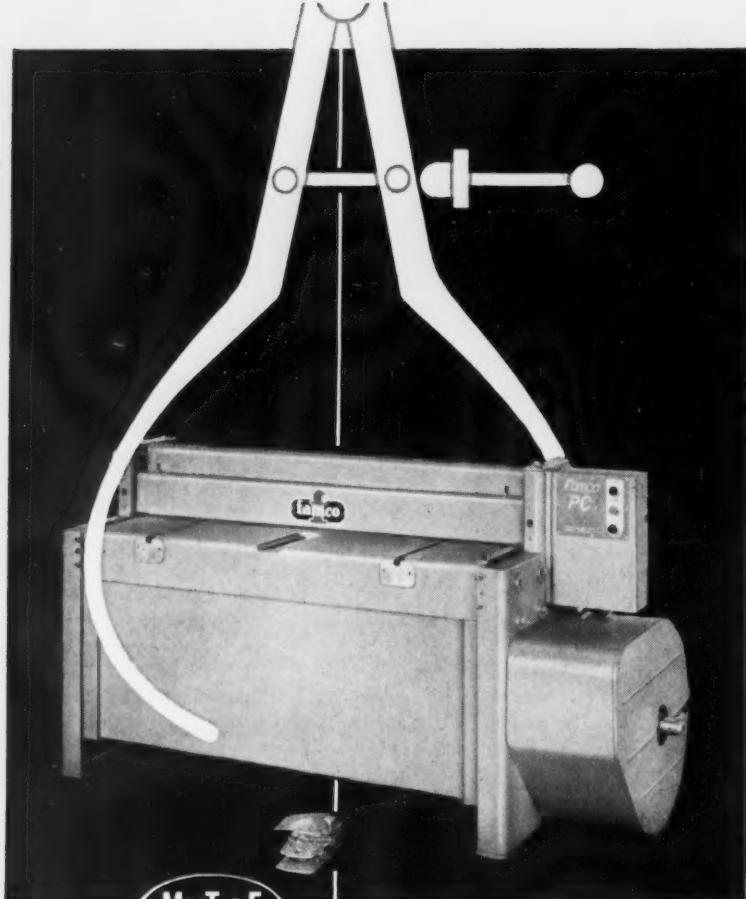
For detailed information contact your nearest dealer or us direct.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

For more data circle 377 on Postpaid Card



MMT-PE



MACHINE COMPANY

Kenosha 2,
Wisconsin

Manufacturers of: Milling Machines, Presses • Air, Arbor, Power, Foot • Squaring Shears, Band Saws.

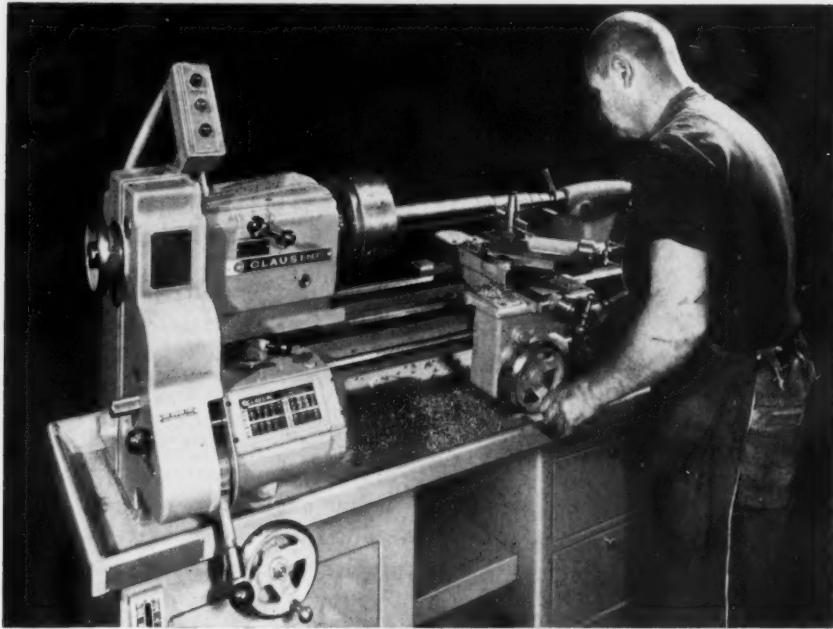
Only Famco Squaring Shears
enable you to have a shear tailor-made
for your specific needs.

Available in 22 standard models (foot,
air, power and high speed) and cutting
widths ranging from 22 to 96 inches. We
are also the largest builder of special
shears in the country and we invite your
inquiry on these.

May we send you our Squaring
Shears brochure?



For more data circle 378 on Postpaid Card



Now... crown-shaved gears standard equipment on Clausing 12 $\frac{1}{4}$ " lathes!

All gears on Clausing lathes are crown-shaved for quieter, smoother operation and greater accuracy than ever before. It's another PLUS feature that makes Clausing truly outstanding among lathes in its class. Here are a few of the many more—

- (1) Flame-hardened bed ways standard equipment at no extra cost.
- (2) Heavier throughout—"have more guts than most of our machines costing 3 or 4 times as much."
- (3) Forged steel spindle, with L-00 or 2 $\frac{1}{4}$ -8 threaded nose.
- (4) "Zero Precision" Timken tapered roller bearings.
- (5) Choice of heavy-duty variable speed or 10-speed countershaft, with clutch and brake optional.
- (6) Verified precision—factory test report accompanies each lathe.

The result . . . this user report is typical of the performance and value you get in Clausing lathes: "After investigating the lathe field very thoroughly our choice was Clausing, and subsequent performance exceeded our expectations. We recommend the Clausing 6300 series lathes as the competition-beating answer in their capacity range." (signed) K & W Machine Works, Springfield, Mass.

See Clausing . . . check, feature for feature, dollar for dollar . . . before you buy any lathe of comparable size. See for yourself why Clausing is acclaimed the outstanding lathe value.

Write FOR ILLUSTRATED CATALOG TODAY



CLAUSING DIVISION

ATLAS PRESS COMPANY

2-110 N. PITCHER ST. • KALAMAZOO, MICH.

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The Answer... TO INDUSTRY'S DEMAND FOR QUALITY, EFFICIENCY AND LOW COST ECONOMY

UNITED STATES ELECTRICAL GRINDERS-BUFFERS



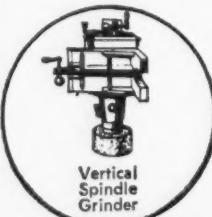
A TYPE
FOR
EVERY
INDUSTRY

An investment in better, faster production through the use of tools expertly designed and conscientiously crafted for your particular purpose.

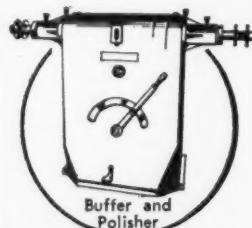
Every grinder, buffer, drill or any other U. S. Electrical Tool is precision-engineered for maximum endurance under exacting conditions. All are electrically and mechanically correct. Rotating parts and spindles are precision-balanced dynamically by electronic equipment.



General Purpose
Grinder



Vertical
Spindle
Grinder



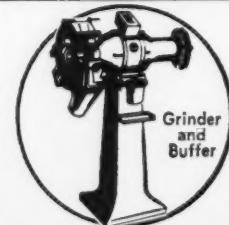
Buffer and
Polisher



Precision Lathe
Grinder



Tool Post
Grinder



Grinder
and
Buffer

"OVER 60 YEARS SERVICE TO INDUSTRY"

WRITE FOR CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

For more data circle 380 on Postpaid Card

When the job calls for
"gearhead motor"

cost-wise designers
specify

BOSTON Gear®
OPTIMOUNT

HELICAL
GEARED

RATIOMOTORS

Add up the SAVINGS and see why...

YOU SAVE DESIGN TIME. Optional mounting gives full scope to your designing skill. Drive arrangements are not restricted by the mounting limitations of conventional gearhead motors.

YOU ELIMINATE EXTRA COST OF SPECIALS. With OPTIMOUNT Ratiomotors FROM STOCK, you can meet hundreds of unusual drive conditions that would require "specials" in conventional gearhead motors. You save the delay and extra cost.

YOU REDUCE PARTS COST. Since OPTIMOUNT offers a choice of many output shaft positions, you can design for direct lineup — and eliminate extra couplings, bearings, and other parts needed to "hook up" a conventional gearhead motor.

YOU SPEED PRODUCTION. Order the OPTIMOUNT you need with a phone call to your local Distributor, for delivery FROM STOCK. You can start production without delay, maintain schedules, and avoid big inventory expense.

YOU SIMPLIFY SERVICING. All OPTIMOUNT components are standardized stock parts — available promptly from over 100 BOSTON Gear Distributors throughout the U. S. and Canada.

Ask your BOSTON Gear Distributor for complete information. Boston Gear Works, 68 Hayward St., Quincy 71, Massachusetts.

**Meet any in-line drive mounting conditions
with STANDARD STOCK models**

Vertical or horizontal base mounted — for any floor, wall, or ceiling mounting position — choice of many shaft positions in either base — single or double reduction helical gearing — for $\frac{1}{2}$ to 10 hp drives. Sold also without motor, ready for attachment of separately purchased motor of your choice.

Order from your nearby Distributor and get
any arrangement you specify — ready to install

From Stock!
at factory prices

Horizontal
base mounted



Adv. copyright by Boston Gear Works

For more data circle 381 on Postpaid Card



VERTICAL BASE MOUNTED OPTIMOUNT RATIOMOTOR drives agitator blade shaft on pigment mixers in coated textiles plant. Manufacturer says: "OPTIMOUNT adaptability permitted simplified, efficient design for our specific needs . . . at a much lower cost for the complete installation."



Ask for Catalog
No. 57

CALL YOUR NEARBY

BOSTON Gear®
DISTRIBUTOR

— STANDARDIZATION PAYS —



See inside back cover
for location of Distributor
nearest your works.
Yellow Pages

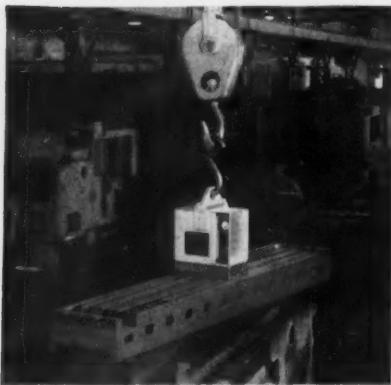
Make work handling safer, faster, easier with self-contained lift magnets

SIMPLE OPERATION permits any worker to handle heavy, irregularly shaped workpieces without danger or damage when conventional work-handling equipment is converted to magnetic lifting with Sundstrand "Power-Grip" lift magnets.

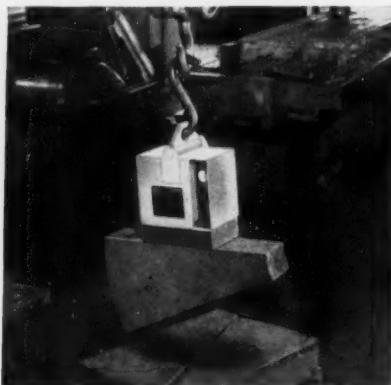
QUICK CONVERSION of job or overhead cranes from conventional to magnetic lifting because unit is self contained battery operated and does not require external power connections. Remote controls can be provided if desired.

TWO CAPACITIES available offer 2,000 and 4,000 lb. of lift. Power is supplied by conventional automotive type 6 and 12 volt batteries.

SELF-CONTAINED POWER makes lifting power available in plant or out. Receptacle provided for trickle charger that brings battery up to full charge during idle hours. Dial shows charge condition.



Positioning machine table in assembly.



Lifting heavy pie-shaped segments.

DISTRIBUTORS: Sundstrand Lift Magnets offer attractive sales opportunities. Investigate. Details on request.



SUNDSTRAND-AMERICAN BROACH

DIVISION OF SUNDSTRAND CORPORATION

ANN ARBOR, MICHIGAN

For more data circle 382 on Postpaid Card



FOR THAT EXTRA EDGE IN PRODUCTION!

3½ TIMES MORE END MILL PRODUCTION with the New B&S Thriftmill® in Competitive Shop Tests!

20% Lower Initial Cost, Superior Microfinish
and Less Downtime also Proved using new
B&S Thriftmill.®

**54" LENGTH OF CUT
WITH B&S
THRIFTMILL®**

**15" LENGTH OF CUT
WITH BRAND "X" END MILL**

TEST DATA

MATERIAL:

MATERIAL: AISI-D3
oil hardening tool steel.
Hardness, Rockwell
C-18.

BOTH END MILLS

½" Dia., 4 flute.



CUTTING DATA

	RPM	SFM	CHIP LOAD	TABLE FEED	DEPTH CUT	WIDTH CUT	LENGTH CUT
B&S Thriftmill®	325	43	.00125	1⅛"	¼"	½"	54"
BRAND "X" End Mill	325	43	.00125	1⅛"	¼"	½"	15"

MICROFINISH AFTER TESTS

B&S Thriftmill, bottom of slots, RMS 35.

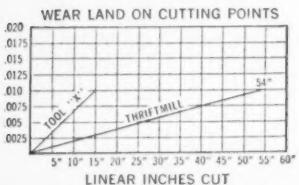
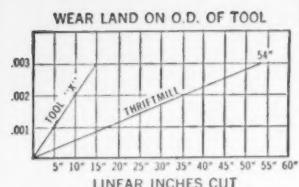
B&S Thriftmill, sides of slots, RMS 30-38.

BRAND "X" End Mill, bottom of slots, RMS 70-100.

BRAND "X" End Mill, sides of slots, RMS 40-60.

The initial economy of the new B&S Thriftmill, together with the proven production benefits engineered into this fine tool, gives a competitive advantage to all B&S Thriftmill users.

There are 1065 different "standard" off-the-shelf B&S end mills to choose from. End wonder, worry and wait—take advantage of B&S tooling superiority and speedy service—call your B&S Distributor now.

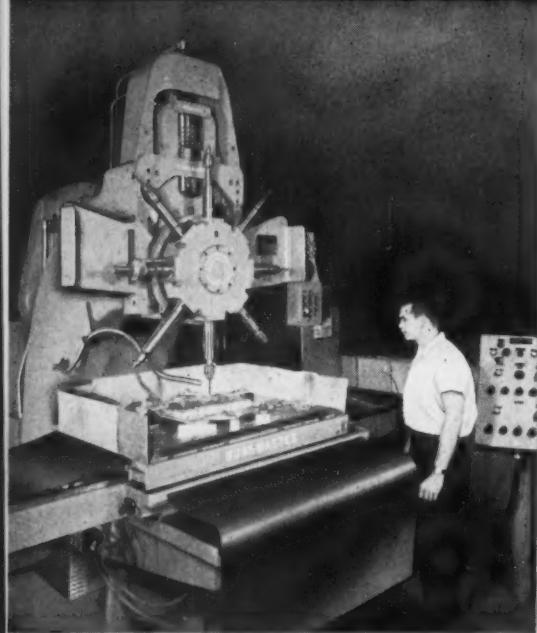


Send for "Condensalog" to: Cutting Tool Division, Brown & Sharpe Mfg., Co., Providence 1, R. I.

Brown & Sharpe
HIGH SPEED STEEL CUTTING TOOLS

NELCO
CARBIDE CUTTING TOOLS

Tool Savings on Small Lots During **BURGMASTER** tape controlled



Speed Production, Cut Costs of Experimental or R & D Parts.

Less time, from the drawing board to the finished part—this is the simple formula that works to your advantage when producing lots of any size with the tape controlled Burgmaster Turret Drilling Machine.

268 operations on 100 holes are produced 8 times faster on this Rocket Instrumentation Panel. During machining, one tool change is made on two spindles. Note the simple holding clamps.

Maximum Flexible Automation---

for Drilling, Boring and Tapping Lots of Any Size

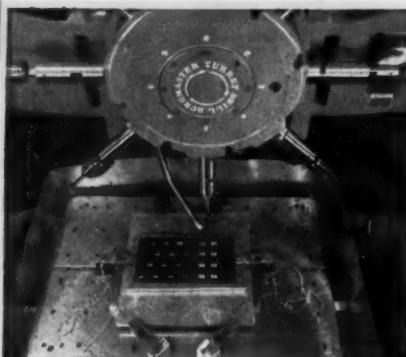
At Rocketdyne, small lots are no limitation for using the automatic Tape Controlled Burgmaster. The fact is, small lots point out the basic advantages of Tape Control for close tolerance hole operations.

jigs are eliminated and simple clamps are used.

costly tool room procedures for special tooling is greatly minimized. lead time is reduced because of less time to program, prepare a tape, and make a machine set-up.

surer, faster production is assured because the Burgmaster is automatically tape controlled for fast, accurate machining cycles.

engineering changes are quickly accomplished by simple tape changes.



World's Largest Builder of Turret Drilling Machines



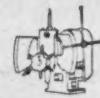
"D" Manual
Power Index
3/8" Capacity



1C Manual
Power Index
3/8" Capacity



2B Manual
Power Index
3/8" Capacity



2BF Flange Mounted
Power Index
3/8" Capacity



2BH Automatic
Hydraulic
3/8" Capacity



2BR Ram Type
Hydraulic
3/8" Capacity



2BNT Automatic
Tape Controlled
3/8" and 1 1/2" Capacity



3BH Automatic
Tape Controlled
3/8" Capacity

1 Year Will Pay for \$68,000.00

8 SPINDLE TURRET DRILL

Tool savings alone will pay for a \$68,000 Tape Controlled Burgmaster Turret Drilling, Tapping and Boring Machine within a year, while producing small lots from 3 to 5 parts. In addition, the machine is producing up to 8 times more parts compared to conventional machining methods.

Time is the vital element in producing Research and Development hardware and production at Rocketdyne moves fast in order that parts in process will reflect improvements determined by latest tests. The tape controlled Burgmaster is an answer to getting into production fast and making engineering changes rapidly and inexpensively.

Parts are clamped on the 30" x 45" positioning table using an aluminum sub-base and simple clamps instead of expensive tooling with drill bushings. Table positioning is 180° per minute, being automatically controlled by tape to accurately locate the work on two axis for each setting simultaneously. The tape also controls the selection of proper spindle sequence and all machine functions. In addition, all standard adjustable Burgmaster controls are maintained including pre-selective spindle speeds, infinitely variable pre-selective temperature compensated

SEQUENCE OF 268 MACHINING OPERATIONS

Spindle No.	Tool	No. of Holes	Speed	Feed
1	No. 1 Centerdrill	72	2400	.003
4	No. 4 Centerdrill	28	2400	.003
2	.159 Drill	52	1540	.005
6	Tap 10-32NF-3B	52	330	.031
5	Tapmatic Head	16	2400	.003
7	.136 Drill	16	2400	.003
3	Tap 8-32NC-3B	16	330	.031
4	Tapmatic Head	10	490	.003
5	.106 Drill	11	770	.003
8	.75 Drill	7	1200	.004
1*	.406 Drill	4	2400	.004

*NOTE: Tools are changed on spindles No. 1 and No. 4 after a programmed machine stop.

feeds, selective rapid approach and return.

There is a Burg representative or dealer near you that will supply all the facts — call him at no obligation.

Job Facts

- Machine:** Burgmaster 8BHT 8-Spindle Turret Drilling, Tapping and Boring Machine with 30" x 45" Positioning Table and GE Tape Controls.
- Company:** Rocketdyne, a Division of North American Aviation, Inc., Canoga Park, California.
- Part:** Rocket Instrumentation Panel.
- Material:** 1020 steel plate, 1/4" x 9" x 18".
- Operations:** Centerdrill and drill 100 holes, tap 68 holes; a total of 268 operations.
- Holding:** Standard clamps.
- Quantity:** Five parts.
- Accuracy:** Table positioning to $\pm .001"$.
- Former Method:** Line of single spindle drills using drill jig.
- Former Time:** One part per day.
- Present Time:** Eight parts per day.
- Advantages:** Increased production 8 to 1, lead time drastically reduced, tool saving alone will approximately pay for \$68,000.00 Burgmaster Machine within a year.

Write for Bulletin describing Burgmaster 6 and 8 spindle Tape Controlled Turret Drilling, Tapping and Boring Machines. See Burgmaster Machines in action: Thirty-minute 16mm sound film showing all Burgmaster Turret Drills in operation is available from any Burg office without charge.



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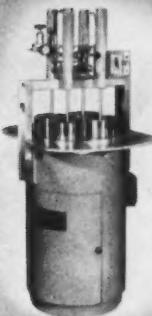
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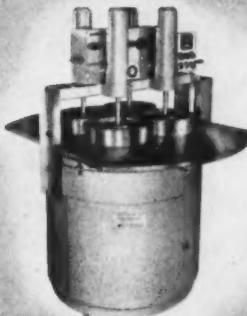
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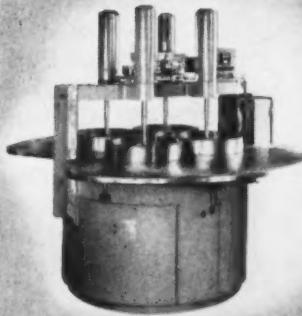
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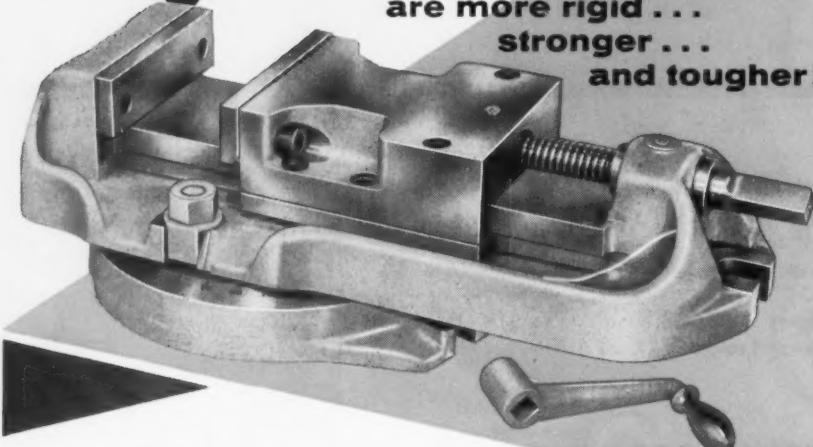
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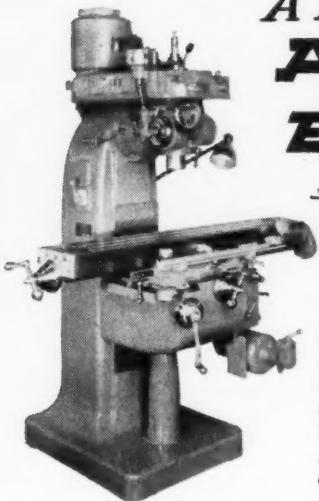
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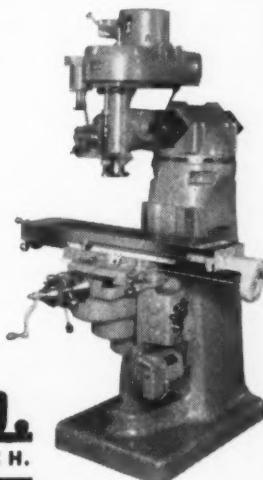


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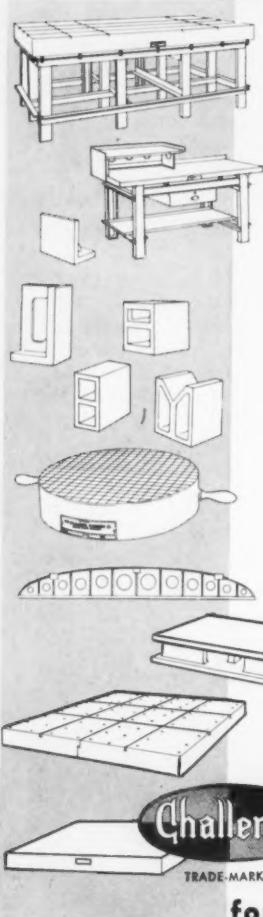
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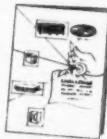
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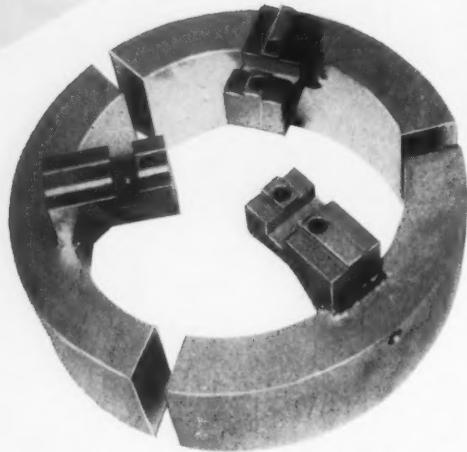
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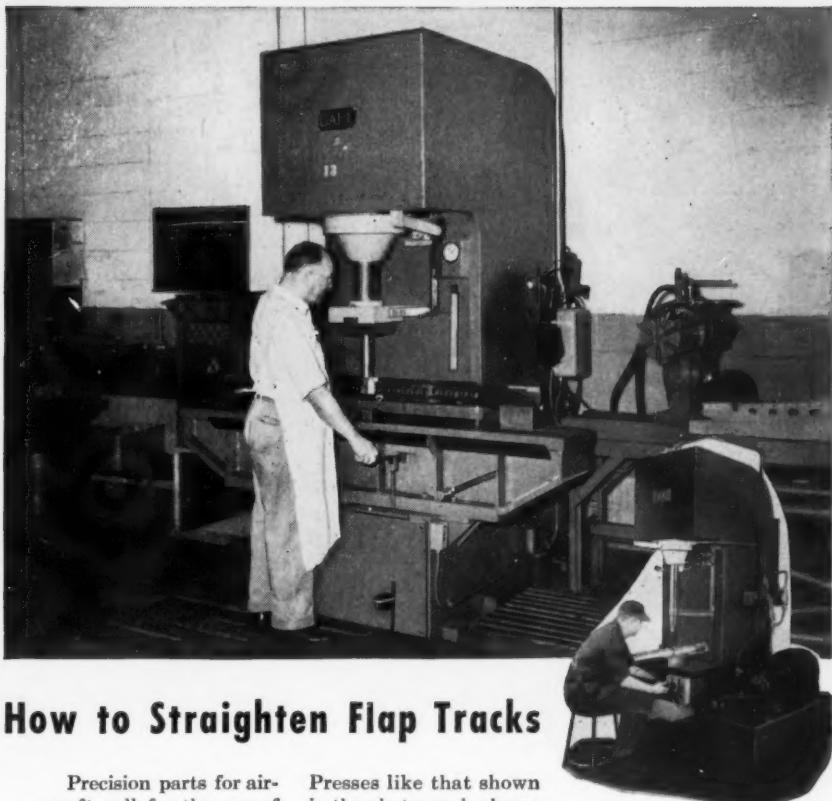
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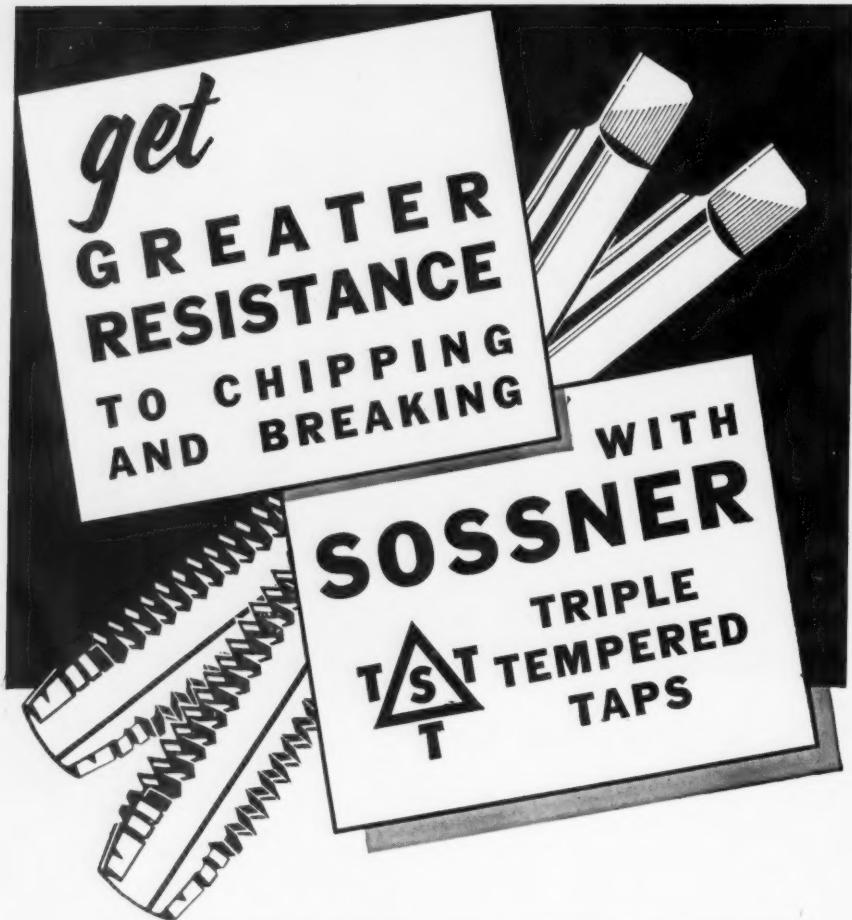


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MODERN MACHINE SHOP 97



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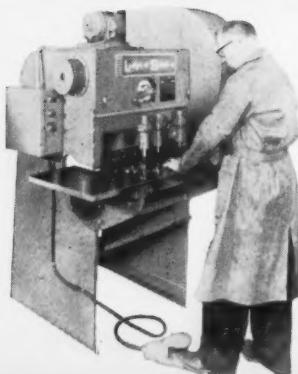
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MODERN MACHINE SHOP 101



Fred W. Vogel

Over the Editor's Desk

LONG RANGE VIEW

It is rather significant, we feel, that at the outset of this present year so many of the experts in various fields either forgetfully or deliberately sidestepped the usual prediction for just the year ahead and instead projected their views on business activity for an entire decade ahead. Could this change toward longer range predictions be due to an influence which we could readily pass over or not recognize at all?

On the national and international levels, it does now appear to many people that one of the most significant changes taking place at the present time is a swing away from costly and burdensome military rivalry toward productive economic rivalry. Compared with military rivalry, economic rivalry certainly should provide a greater sense of stability, a more agreeable commercial climate in which to plan and an overall genuine feeling of worthwhile accomplishment. Perhaps now because of these various stabilizing influences, it is possible to make longer range predictions with a greater degree of accuracy than ever before.

Let's take a look now at some long-range versus short-range predictions which the following statements seem to verify. For example, Frederick H. Mueller, Secretary of Commerce said "The Commerce Department in 1960 will take the great Decennial Census. We expect it to reveal a record population of 180 million, up 29 million since the 1950 census, now growing at the rate of 3 million a year. This amazing population expansion will continue. Savings will be increased. Business will invest the money in research and in more efficient facilities. This, in turn, will make jobs and create an abundance of new and better products. All these factors can fashion the 1960-1970 decade into the most challenging and most rewarding of history."

Or take the statement of M. W. Saxman, president of Latrobe Steel

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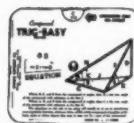
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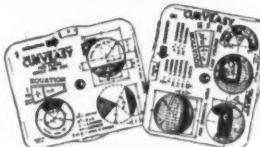
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Over the Editor's Desk . . .

Company who said, "America's tool steel industry faces the greatest challenge of its entire history as it moves into 1960. In the next decade, this segment of the steel industry, which now measures its output in pounds, must gear itself to larger tonnage production. Today's output of metals for Space Age vehicles is insignificant when compared to anticipated needs of 30,000 to 45,000 tons annually during the next few years."

The outlook expressed by H. Thomas Hallowell, Jr., president Standard Pressed Steel Company mentions, "The tool and die industries should be up sharply, sparked largely by a great increase in tooling for not just automobiles but most other metal products, too. This is partly the result of successful research into new products for the fabulous 1960's."

M. C. Patterson, Chrysler Corporation vice president and general manager of the Dodge Division said, "In the 1960's, I believe we will also see a faster rate of innovation and product change, more use of the automobile as a personal and individual means of transportation, and a sizeable expansion of the automobile market. In the decade ahead, we in the auto industry will continue to adapt the automobile to the changing demands of the times. Our success in the Sixties will be directly proportioned—as it has been in the past—to our ability to make the automobile increasingly attractive, useful and satisfying to the individual as a machine for modern living."

If we are headed for a period relatively free of upheaval by military aggression perhaps all of us could profit from making longer range plans than we have dared to make heretofore. At least, it would seem to be a good thought to keep in mind.

★ ★ ★ MODERN MACHINE SHOP ★ ★ ★

SHORT RANGE VIEW

It has always been our feeling that financial or investment people are inclined to take a more critical view of business activity than almost anyone else. The critical view, of course, is tempered by careful analysis of the present situation, the experience of past conditions and a conservative measure of future prospects. We think it is rather encouraging, therefore, to see what Arnold Bernhard of The Value Line Investment Survey recently had to say about machine tools and machinery.

"A dramatic upturn from a severely depressed level is in prospect for the



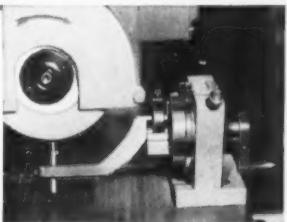
Another advancement
in perforator
grinding...

HARIG
Grind-All
FIXTURE

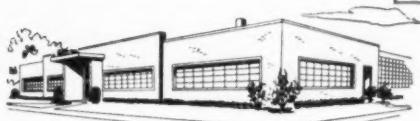


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February, 1960

MODERN MACHINE SHOP 105

Harig
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Over the Editor's Desk . . .

machine tool industry during 1960. Volume of the industry as a whole is expected to be up on the order of 50 percent, with profit gains likely to be even more marked. The chief beneficiaries will be builders of heavy, complex tools—demand for small hand tools will probably be only moderately above the 1959 total. But few of the renowned growth companies will experience earnings advances so spectacular as those in store for some of the major machine tool makers next year. Dividend increases will be much smaller, because several of these companies maintained payments not warranted by the level of profits in 1959. Nevertheless, some half-dozen or more tool companies may raise their dividends in 1960."

"If an ample supply of steel can be obtained, sales of machinery and equipment should reach a new record high next year. The gain is not likely to be so great as the 15 percent increase looked for in overall capital spending, however, because the largest proportionate rise is expected in the area of industrial construction. Machinery makers are hopeful that the bigger inflow of business will be more profitable, too—a number of these companies have been working off business booked at very competitive prices during and just after the recession. Assuming larger unit volume and a better price structure next year, we look for a general widening of margins and an industry pattern of higher earnings and a number of dividend increases."

★ ★ ★ m o d e r n m a c h i n e s h o p ★ ★ ★

AT YOUR SERVICE

We think we would be a bit negligent in the performance of our job if occasionally we did not point out some of the special features of this magazine which are designed to help you do your job just a little bit better. For example, if you wish to find some information on a specific tool or piece of equipment, first turn to the WHERE TO GET IT section located at the back of each issue. Here, beside the items listed, you will find page numbers which refer either to an advertisement or editorial write-up.

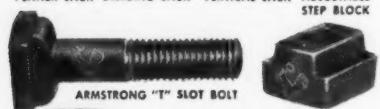
If you require information other than that which appears in the advertisement or editorial write-up, fill out a READER SERVICE CARD and put it in the mail. Your card will receive special prompt attention so that the information you are seeking will be quickly sent to you and with no obligation whatsoever on your part.

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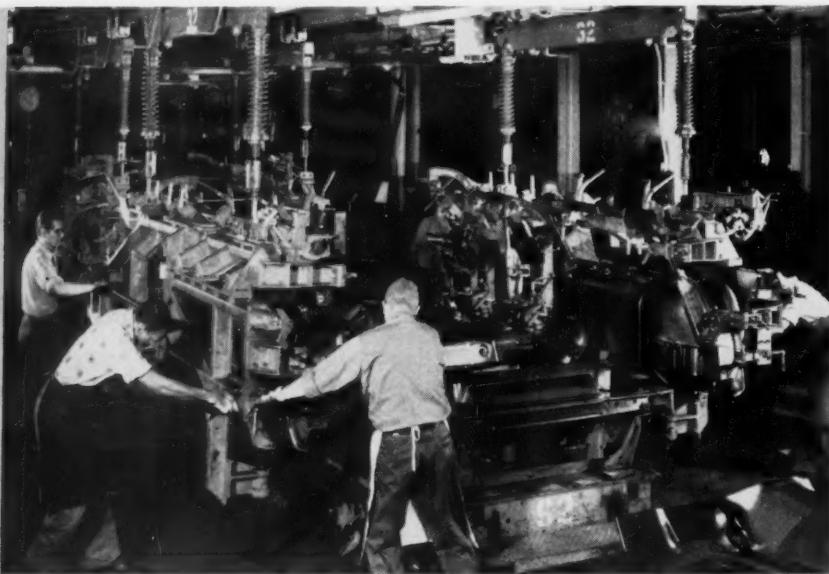
Production Maintained Plant During

Facilities completely rebuilt at assembly plant for 1960 models.

By FRED W. VOGEL
Editor, Modern Machine Shop

Extensive changes in manufacturing facilities, accomplished over a two-year period without interruption of production schedules, has enabled Plymouth Division, Chrysler Corporation to introduce a new type of automobile construction in

its 1960 models and at the same time increase their quality. A multi-million dollar expansion and modernization of the Plymouth assembly plant in Detroit resulted in the complete rebuilding of facilities available for assembly some two years ago.



At start of main "gate line," sides of car body are swung into position in their fixtures and clamped to floor pan. Moments later roof will be placed and body welded together.

at Plymouth Assembly Modernization

A total of 57,000 square feet of floor space has been added, bringing the plant's total floor space to 1,300,000 square feet—the size of 26 football fields. The latest additions bring the total floor space to more than triple that of the original plant, which was 400,000 square feet.

Building of the bodies, formerly done at the Mack Avenue Plant, was transferred to the Plymouth Plant. This entailed a huge transformation of the plant. The six-cylinder engine machining and assembly de-

partments which occupied nearly 25 percent of the total floor space were moved to the Trenton Engine Plant.

A new "gate line" was installed for framing the entire body, from floor pan to fenders, on a continuously moving line. Along the line are 339 new welding machines having an average weight per machine of 685 lbs. There are 64 bases and 32 sets of side frame fixtures on the line, on which bodies are welded together.

A new system of rust-proofing, painting and drying car bodies was



View shows one of the 64 side gate fixtures used in body framing operations. Actually a giant clamp, such fixtures provide perfect fit for sides, floor and roof during welding.

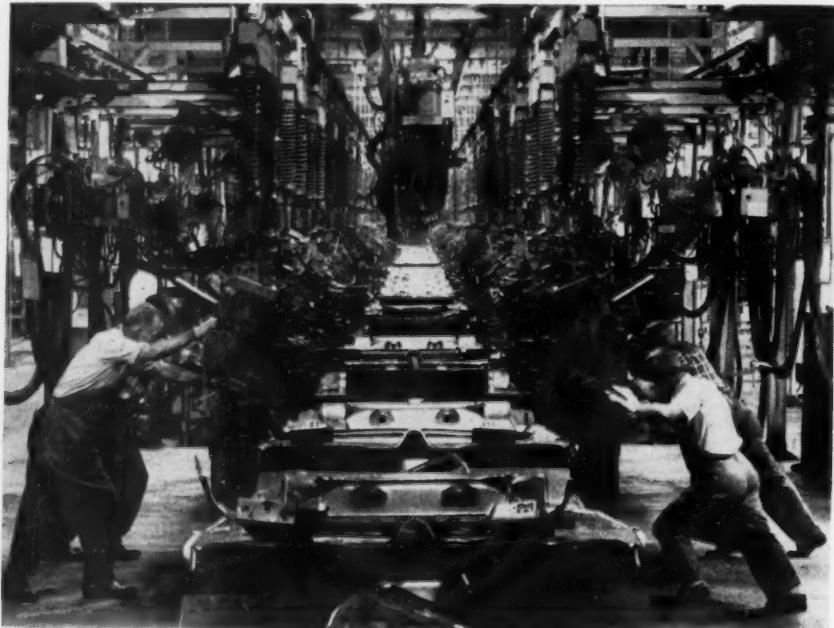
"Before the change, there were 27 miles of conveyors."

installed. This entailed the building of a new paint-mix department, located outside the main building for maximum safety, feeding paint into the 56 individual paint pipe lines which go to the various parts of the plant where painting is done. Also, a new rust-inhibiting system and a series of spray booths were installed in the main area of the plant. In addition, six huge new drying ovens were installed on the roof of the plant, occupying 56,000 square feet.

Practically all of the assembly or sub-assembly lines were relocated or altered. The final assembly line grew from a length of 1,000 feet to 1,972

feet, carrying at any time during the working day a total weight of 368,000 pounds of new cars. A total of 146 overhead conveyors were removed to be replaced by 127 new ones which were located in new positions for manufacturing efficiency. Before the change, there were 27 miles of conveyors. These were removed and replaced by 21 miles of new ones. The reduction was effected through more efficient location of the lines.

The most remarkable aspect of the renovation is the fact that over a two year period the plant was being rebuilt while at the same time it was producing 1958 and 1959 model



Four workers place fixtures into the proper spots on the "gate line." The sides, floor and roof are clamped and solidly welded together on this 352-foot long body framing line.

Plymouth cars. So smoothly was the change executed that there was no lost production time due to the tearing out and replacement of plant installations.

In some respects, the operation resembled a huge game of checkers, as over a week end crews of workmen would move entire departments to make space for new installations. Then, as another crew installed new facilities, another department was moved and its former area cleared for other purposes. One department moved, according to plan and without losing an hour of production time, four times in 21 months.

The physical job of planning the change was tremendous. A total of 926 individual drawings of new equipment and installations was prepared by plant engineers. This figure does not include the thousands of detailed drawings prepared by the 44 different firms of contractors who were employed.

Among the major changes was the moving of Plymouth's body-building operation from the Chrysler Corporation Mack Avenue Plant to the Plymouth Assembly Plant and taking the six-cylinder engine machine shop from Plymouth to the Trenton Engine Plant. Moving the machine shop was a huge operation, necessitating the stockpiling of engines and precise coordination of operations at Trenton and Plymouth, so that there would be no shortage of engines during the move.

The machine shop was moved over a six months period with no lost production time. It involved the transfer of 1,168 machines varying in weight from 1,200 to 88,000 pounds. The move was made mainly by rail-



Operator welds one of the 339 welding guns used on the gate line of the body assembly operations at the Plymouth Detroit assembly plant. Above operator is transformer which provides power for welding gun.

road, and since the loading docks were needed for the arrival of materials for current production during the day, it was accomplished mainly at night. During the peak period of the move, eight flatcars were loaded each night with equipment for transfer to Trenton.

During this same period, these were daily happenings at the plant's east drive:

A dozen trucks were loaded with scrap metal; one semitruck loaded with new bodies would arrive and unload every eight minutes; a mixer truck carrying mixed concrete for new floors arrived every seven minutes; and trucks carrying the broken remnants of old concrete floors were

"... plant features well organized inspection system . . ."

departing as rapidly as they could be loaded. At one point, about 400 yards of concrete was arriving and being poured for new floors, and installations each day.

A considerable change was made in the plant building itself. Walls were torn down and the width of the plant extended; in places the floor was dug up and under-floor conveyor tunnels were built; and the roof was literally raised for the installation of a series of new paint drying ovens. The west wall of the building was extended to accommodate the new paint repair department along 480 feet of the building. Nearly half of the floor in the plant is new.

While the plant was being rebuilt, it was also being redecorated. Section-by-section the interior was steam cleaned, and then painting contractors came in and spread some 32,000 gallons of paint over the walls and ceiling of the building, which is four-tenths of a mile long.

The stamp of approval appearing on the lower left corner of the windshield of every Plymouth leaving the assembly plant means that the car has passed one of the most rigorous quality control testing programs ever conceived in the automobile industry.

With seventeen inspection stations located at calculated points along the plant's assembly line and 210 quality control inspectors, the plant features a well organized plant inspection system which is designed to assure high quality.

Plymouth's quality control department operates independently of manufacturing and assembly. In effect,

each inspector critically checks every automobile as if he were the customer to buy that car.

Five of the seventeen stations are called master stations. It is at these five points that the inspectors are called "buy-off" inspectors. These inspectors go over the entire car as assembled up to that point and either "buy" the product made or else "don't buy"—that is, reject the car. This latter car then goes back into the line for complete rework. If they do "buy" the car, it continues on down the line.

The first "buy-off" inspection point is at the end of the body-in-white. At the second major inspection point, the paint write-up is prepared and travel tickets are attached to each car. These travel tickets contain all inspection notifications and corrections. The third "buy-off" point is where the underbody, hardware, motor and chassis are checked. The fourth "buy-off" inspection point is the functional roll test to check engine, transmission, rear axle, the lighting system, and all other moving parts.

The final "buy-off" point is the inspection at the special "conditioning" line where corrected work has been done. If all inspectors "buy" the car, it is shipped from the plant to the dealer.

Quality control boards are placed in view for all employees at 26 points throughout the assembly line. These charts are updated every two hours by the quality control department based on a sampling of twenty cars picked at random out of the line.

This sampling is taken four times during each regular working shift.

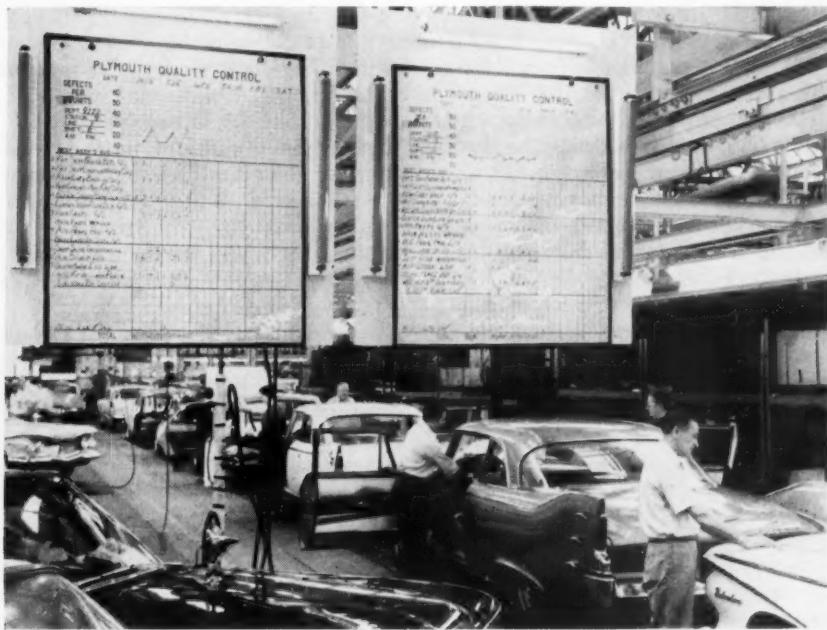
At the end of each day, a daily rating sheet is given to each foreman showing quality of every component and the automobile as a whole.

Besides the internal inspection setup, outside vendors and Corporate suppliers are all required to provide initial samples before shipping in quantity. This system provides the receiving plant with the quality protection needed for new parts.

The other major activity in Plymouth's quality control department is the quality engineering section. The quality engineering section is both analysis and correction group supporting the inspection section.

The quality engineering section develops the methods, frequencies, charts, and instruction sheets by which the inspection section performs its job. Quality engineering reviews engineering specifications and design requirements, and recommends changes in design which will improve quality.

To be successful, quality control has to be more than a system of check, control and corrective points. Every member of the Plymouth manufacturing team, from the top executive right down to the stock chaser, is encouraged to think that a quality product or service depends on him or her. At Plymouth, quality production is continuing and repetitive.



Two charts, one for each shift, indicate to personnel the effectiveness of their quality efforts. There are 24 pairs of such quality control boards spaced throughout the plant.

LET AN AUTHORITY TELL YOU



How to Solve Your Supervisory Problems

By **ALFRED M. COOPER**
Contributing Editor, *Modern Machine Shop*

A letter from a journeyman toolmaker, employed in a machine shop in Bridgeport, Connecticut, points up a problem that faces many similar highly skilled artisans who are being considered for promotion to the rank of shop foreman. This man's problem is by no means an uncommon one, but it is nevertheless perplexing to the potential supervisor, and it is well worth the careful consideration of management.

Briefly, this journeyman, with a diversified background of 26 years of experience in his field, has been informed "off the record" that he is to succeed the present foreman, who is about to retire. However, this artisan has but 15 months' seniority in this plant, and wonders whether his promotion may not create dissension among employees of longer service. Also, as so often happens, this man has become accustomed to his work as toolmaker, and is not certain in his mind that he will like the change to supervisory work.

As I have pointed out, this situation is by no means uncommon among mature, highly skilled artisans. It would appear that only the very young employee is positive he is qualified to run a department, an entire plant, or perhaps the universe, without giving more than passing thought to the matter.

But, as I explained to this toolmaker, his superiors have studied him for some time before making this tentative offer of promotion to supervisory rank. If they have selected him rather than those of longer service in that plant, it is because they are convinced that he is the man for the job. And, of course, I advised him by all means to accept the promotion and thereafter do his level best on the new job.

He will find supervision a distinctly new trade or profession than that in which he has been engaged for 26 years. But if he has confidence in his management, and is sold on the American system of freedom of

*For answers to your perplexing managerial problems address your letters to:
Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio.*

opportunity for all those who have what it takes, he will welcome this promotion and make every effort to meet the challenge offered and thereby succeed as a foreman.

The very best material from which to develop foremen is the highly skilled artisan, and it is not necessary that he has spent his lifetime in a single plant. During his years of "diversified work" he will find that somewhere he has already picked up much that he needs to qualify as a good foreman. Often he has had opportunity to study the methods of a good foreman in getting out production that excels in quantity and quality. Or he may have observed a poor foreman making scores of mistakes in handling subordinates—playing favorites, getting hardboiled or too easy-going, failing in dozens of ways in looking after the physical condition and mental attitude of those reporting to him—and determined years ago that he would never emulate that fellow.

Now he will do well to read every book he can that deals with supervising people, and from these select the material that applies to his particular plant and group of subordinates. If he attempts to apply everything he reads he will not only soon become confused but he will definitely confuse those reporting to him. We all place too much reliance on the printed word. In the beginning he will do well to make as few changes as possible until he has become acquainted with his new job and his subordinates have become accustomed to seeing him around as their boss.

One thing the new supervisor must constantly bear in mind: *he cannot*

continue to be socially familiar with a few of the people in his department. If he does this he will create resentment among those who do not rate as pals of the boss, but who may nevertheless be the best men in the organization. Frequently this is one of the toughest decisions a new foreman must face, but any other course inevitably leads to a feeling that he is playing favorites, and this belief crystallizes if he selects some old friend for promotion to a better-paying job. The necessity for a certain degree of aloofness from all subordinates may be considered the price any man must pay for getting ahead.

Another thing: every brother supervisor and executive has a definite responsibility to give all possible aid and cooperation to the newly appointed supervisor. Most of these head men will so cooperate; occasionally an oldtimer will be encountered who feels he should go out of his way to make things tough for the new foreman. Whenever such action is spotted by management sharp remedial measures should be taken.

The new supervisor has enough to contend with without having his job made more difficult than necessary. Fortunately, most supervisors and executives sympathize with the position of the new boss and really rally 'round to give him all possible assistance while he is becoming oriented to this new art of *getting results solely through the efforts of others*.

They should. For on the success or failure of the immediate supervisor of any group of workers depends not only the financial success of that plant but the complete success of our American way of life.

Unusual forming method solves heat treating

Cryoforming* controls and directs sheet metal growth caused by heat-induced phase change.

By W. E. McFEE

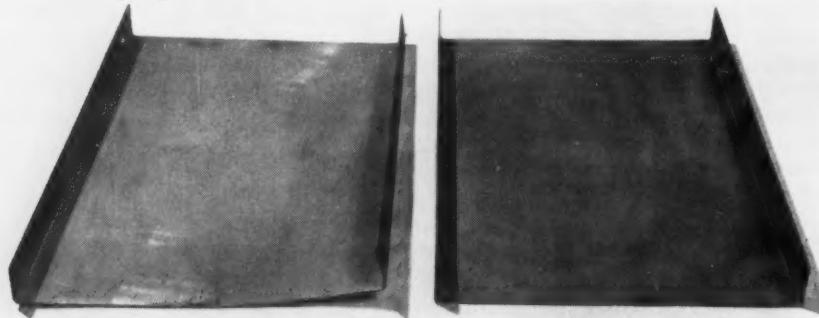
In forming parts from sheet metals, production men are now working within tolerances that were scarcely mentioned outside experimental drafting rooms only a few short years ago. Parts for high speed aircraft and missiles that once would have been considered almost perfect now end up being reworked and even rejected.

Many of the close tolerance parts are fabricated from precipitation-hardening stainless steels. Then they

are heat-treated after fabrication to bring out their high strength properties. While these steels alleviate the warpage and distortion problems encountered with quenched and tempered steels, the heat-treating process induces a "phase" change that results in growth or expansion of the part in all directions.

In two of the Armco precipitation-hardening stainless steels — Armco 17-7 PH and Armco PH 15-7 Mo—both widely used in aircraft and missiles, this growth amounts to

*Patent applied for by Boeing Airplane Company



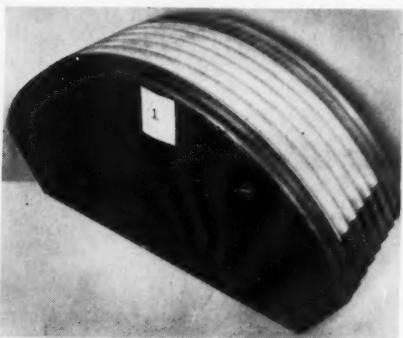
Two parts made of the same material and given the same heat treatment. The part shown at the right was Cryoformed, while the part at the left was simply air cooled.

problems

approximately 0.004 to 0.005 inch per inch of metal. However, a part four feet long would grow about $\frac{1}{4}$ inch during the phase change. Yet the same part may have to be held within ± 0.003 of an inch.

The problem of maintaining near perfect shapes and exact dimensions of aircraft and missile parts is becoming more critical every day. Plane manufacturers and materials producers have been bending every effort to find a solution to this problem of maintaining such close tolerances.

Now, Boeing Airplane Company engineers appear to have the answer. Boeing's process, called "Cryoforming," has proved amazingly accurate and surprisingly simple. What's more, it is applicable to most sheet



Cryoformed corrugated part fits snugly to its die after being fully heat treated.



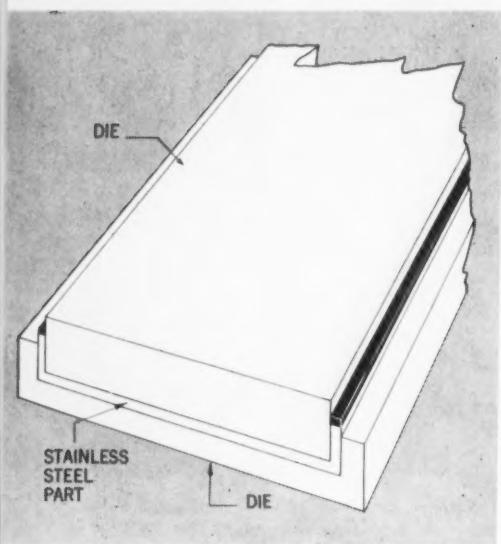
Cotton gloves are all that are needed for protection in placing parts in dies for Cryoforming. At this point, the parts have cooled from 1750 deg. F. down to room temperature.

metals that are hardened by a heat-induced phase change.

Instead of stopping growth during the phase change, Cryoforming controls and directs its growth. Take a flanged part made of one of the PH stainless steels, for example. Suppose the length of the flanges isn't too important, but the distance between them is highly critical.

First, the part is rough-formed to slightly less than the desired final dimensions and heated to a conditioning temperature of 1750 deg. F. Then it is allowed to cool to about 125 deg. F., which is above the temperature where the phase change begins. Just before the phase change gets underway the rough formed part is clamped in dies having the exact dimensions of the finished part.

"No expensive machined and hardened dies are needed . . ."



As the metal grows, it fills in the contours of the dies. Any excess metal flows into the flanges, as shown in this sketch.

The dies have been preheated to about 125 deg. F.

The assembled dies and parts are placed in a refrigerator and cooled to minus 100 deg. F. to complete the phase change. As the metal grows it fills in the contours of the dies. Any excess metal flows into the flanges (see sketch).

When the phase change is completed, the parts are removed from the dies and aged at 950 deg. F. Aging causes no distortion, and shrinkage is about 0.0005 inch per inch.

The same technique will hold critical dimensions and shapes in corrugated parts, unusual configurations, anything where provision can

be made for excess metal to flow into dimensionally non-critical areas of the part. However, it should be pointed out that Cryoforming may be difficult or impossible to apply to certain parts that do not have open ends; tubular rings, for example. Needed to assure accurate shapes and dimensions are accuracy in the dies and enough pressure to hold them together.

No expensive machined and hardened dies are needed for Cryoforming. In fact, any material that will withstand this range of temperature is satisfactory, provided it has a low coefficient of expansion. Cerrobend and Kirksite are quite adequate, but the faces of dies made of these materials should be coated or the stainless steel parts cleaned after forming to avoid possible surface contamination. Dies could well be made of plastic, concrete or even plaster.

Easier still, the face of the dies can be made of the stainless steel used for the parts. It has to be set in one of the materials mentioned above. Stainless steel faces have at least two distinct advantages. They avoid any danger of contamination from the back-up material. And when a run is finished, the back-up material can be removed and the face sheet stored for future runs, eliminating much of the cost of die storage.

★ modern machine shop ★

Machine-Shop Estimating.
Second Edition. By W. A. Nordhoff.
Published by McGraw-Hill Book
Co., Inc., 327 W. 41st St., New York

36, N. Y. 532 pages, 6 x 9 inches. Cloth binding. 344 illustrations. Price, \$9.00.

This is a new edition of a manual designed to help readers estimate the time any machining job will take. All the machining operations performed in the average shop are covered with a description of each machine and the work it does, data for making estimates of its operations, and a sample estimate. Based on the author's own time-study and estimating experience, time values are given for every operational element, which the estimator may then combine to find total time for a

job from setting up to completion.

The Second Edition discusses the relation between production and horsepower available in the equipment. Tables have been increased and enlarged to include such information as power constants and horsepower factors; relative machining factors for various qualities of cutting materials and different types of cutting tools; estimating data for the turret drill press, the Cri-Dan threading machine, and drilling by the electrical discharge method. Machine-tool data of horsepower, spindle-speed and feed ranges fully reflect modern operating conditions.

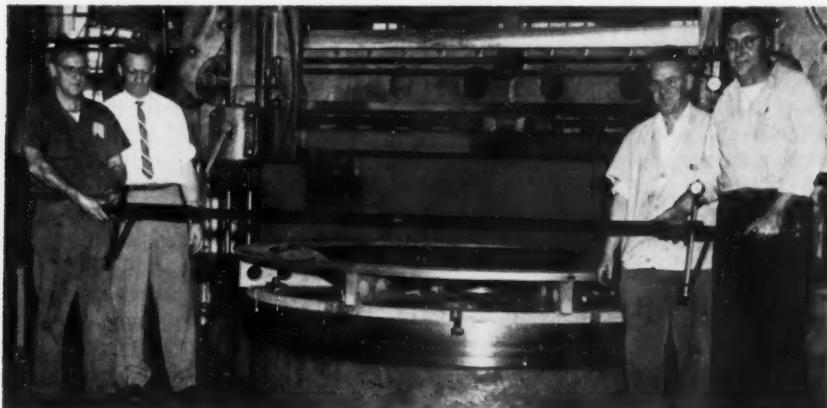


King-Size Gage

Said to be the largest gage of its kind ever produced, the shallow diameter gage shown in the accompanying illustration was recently delivered to the Medium Steam Turbine, Generator and Gear

Department of General Electric Company. Nine feet long, the gage is used to measure diameters to extremely close tolerances. It was designed and manufactured expressly for General Electric by Standard Gage Company.

For more data circle 1 on Postpaid Card



Four General Electric employees pose with new 9-foot long shallow diameter gage.



Surface Finishing Hardened Alloy Steels

View shows horizontal-spindle surface grinder equipped with 168-inch magnetic chuck for use in grinding high speed steel planer knives in large loads. Illustration courtesy Mattison Machine Works, Rockford, Illinois.

Method assures production of high quality, accurate surfaces regardless of hardness of material.

By JOHN E. HYLER

Since early automotive manufacture began imposing ever-greater requirements for the maximum of strength and/or toughness in steel, as against lowest possible weight, there has been a rapid and constant development of alloy steels. Such steels, although more costly than plain carbon steel, nevertheless justify their use in countless applications. So many types are now available (particularly if one considers tool steels along with the rest) that proper choice for a given purpose involves considerable care in selection. By using different alloying elements, behavior of material during heat treatment and hardening is

modified in various ways. In fact, that is the basic purpose of alloying.

In any case, grinding is recommended for proper surfacing or other finish machining on hardened products. Since the development of large modern surface grinders, surface grinding has proved highly advantageous for finishing operations. No matter how hard the material, surface grinding wheels on modern machines turn out smooth, true, accurate surfaces. Nevertheless, various problems are involved in selecting best wheels for given types of material. In this respect, one can seldom do better than consult with engineers of grinding wheel manufacturers;

"... it is possible to quickly and automatically surface finish slender or delicate types of work by grinding."

these men are inevitably and continually associated with surface-grinding problems of all kinds.

Regardless of the degree of hardness of steel being surface ground, the grinding wheel requires only a relatively light touch. Consequently, it is possible to quickly and automatically surface finish slender or delicate types of work by means of grinding.

Obviously, it does not follow that hardened steels can be surface ground on the same basis as softer materials, particularly in reference to feed. Injury can easily be done when surface grinding if a wheel is employed which develops too much heat, or if too much heat is generated through use of too heavy a down-feed. The usual surface grinder may be worked to practically its full capacity where unhardened steel or cast iron is being processed, but grinding of hardened steels must proceed at a much slower rate and with far greater care. The worst type of damage usually manifests itself as cracks. Even though a surface may not be stressed to the point of rupture, however, it may nevertheless contain too much stress for the particular use it is to serve.

In many (not all) cases where surface grinding of hardened alloy steel is involved, the horizontal-spindle type of grinder is employed, which uses the periphery of the wheel to generate the surface. The principle of grinding with the periphery of a wheel involves only a very small amount of wheel area in contact with the work. In terms of heat

generation, this means that both wheel and work stay much cooler. Under these circumstances, both cracking and burning are avoided, and high stresses are not introduced into surfaces generated.

★ MODERN MACHINE SHOP ★

Metal Castings Film

A new film, "Cast Metals and You," depicting the vital role of metal castings in the every-day lives of modern man, has been released by the Education Division of the American Foundrymen's Society, international technical society of the metal castings field. In color and sound, the film dramatizes the importance of an age-old industry to practically every conceivable type of product known today.

In portraying the transformation of the foundry from a personal art to a small handwork operation to broad use of science and engineering, the development of a great basic industry is traced. Film shots depict plant training programs, the skills of the patternmaker, design clinics, and laboratory facilities of foundries and leading engineering colleges.

The film is available for showings to educational institutions and civic groups at no cost except transport charges, and to others at a rental fee of \$10 and shipping costs. Requests for bookings of "Cast Metals and You" should be directed to American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Illinois.

A CASE HISTORY—

COLD HEADING

Automotive

Change in steel solves die-cracking problem in producing studs for automotive ball joint suspensions.

By BARTLETT WEST

A switch in die steels has not merely "solved the problem" for one of the nation's largest fastener manufacturers—it has "made the job possible." These are the words used by Bill Harvey, tool superintendent at Lamson & Sessions Company's Cleveland plant, when he recently described a troublesome production problem. The "job" causing all the difficulty was the cold heading of studs for the ball joint suspensions of several of the leading American automobiles.

Dies cracked under the 12,000-pound interference fit necessary to upset-forge hard Type 8640 tool steel wire into studs. And deformation of the dies after heat treating was high. With rejects high, tool life short, and downtime excessive in replacing dies, production costs soared.

After studying the problem with tool steel engineers, Lamson & Sessions specified Allegheny Ludlum's Ontario die steel on a trial basis. Ontario, a high carbon-high chromium air hardening die steel used for

many cold-heading operations, worked out so well that it is specified exclusively for forming ball joint suspension studs.

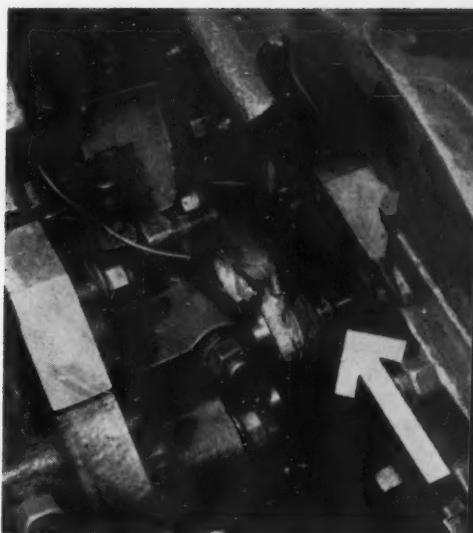
"Dies made from Ontario have increased production at least 15 times, and that's a very conservative



Cracking of cold heading die (left) that upsets stud for ball joint suspension was problem at Lamson & Sessions Company's Cleveland plant. Dies cracked under 12,000-pound interference fit and deformed under heat. Production increased more than 15 times after company switch to Allegheny Ludlum's Ontario die steel, a high carbon-high chromium air hardening steel. Ball is machined into die by hand to a sphericity of 1/1000 of an inch. Stud is made from Type 8640 tool steel.

Studs

Two-step operation on this $\frac{3}{4}$ -inch National Cold Header produces studs for automotive ball joint suspensions at Lamson & Sessions' Cleveland plant. Type 8640 tool steel wire, fed from upper right, is cut into blanks and then upset in die made from Allegheny Ludlum's Ontario die steel. The machine was stopped to show the stud's position in the die.



estimate," said Mr. Harvey. "We've been able virtually to eliminate the cracking and warping that we experienced before."

Allegheny Ludlum supplies Lamson & Sessions with $2\frac{1}{2}$ -inch hot rolled Ontario bar stock for production of the dies. (Lamson & Sessions makes its own dies for its approximately 8,000 different fasteners.) Lamson & Sessions cuts this stock into 4-inch long blanks and then drills a $\frac{1}{2}$ -inch hole into the blank.

A ball is then contour-bored on the die's end to a $1/1000$ -inch sphericity on an engine lathe. During and after this hand-machining operation, the ball of the die is visually checked for size on a comparator. On this unit, an enlarged view of a lead casting of the die's spherical ball is superimposed over a blueprint or sketch of the stud to be formed.

Depending on the finding, the die is either further machined or sent on

to be hardened and stress relieved at 1840 degrees F. in a furnace. It is in this process that former dies deformed. Dies made from Ontario have proved so stable in size, Mr. Harvey pointed out, that they do not have to be checked on the comparator for deformation after heat treating.

The die is then sent to the tool finishing department where the shank is carbide-reamed and tapered to final dimensions—2 inch outside diameter, 4 inches long. It is now ready to be fitted into the die block of the two-step $\frac{3}{4}$ -inch National Cold Header and to begin turning out studs for automotive ball joint suspensions.



Tools for the WRONG Trade



Combating the criminal craftsmen who specialize in tool thefts requires the diligent assistance of all law-abiding individuals.

By JOHN EDGAR HOOVER
Director, Federal Bureau of Investigation,
United States Department of Justice

Every year criminals bilk the American business world of millions of dollars worth of property. Included in their annual loot are quantities of expensive machine equipment and precision tools. Aware of the value of these goods, hoodlums consider the returns from such thefts to be lucrative.

The investigation of property thefts is, of course, primarily the responsibility of local law enforcement. In the early 1930's, however, criminals—aided by fast, modern transportation—were thwarting the law by fleeing across states lines with their loot. *Since the local authorities' jurisdiction stopped at the state line, the fleeing felon often enjoyed the status of the "untouchable."*

In 1934, Congress corrected this unfortunate situation with a series of Federal Crime Bills. Included in this legislation was the Interstate Transportation of Stolen Property Act which makes it a Federal offense to knowingly transport in interstate or foreign commerce stolen goods valued at \$5,000 or more. Violators of this statute are subject to a fine of

not more than \$10,000, or imprisonment for not more than ten years, or both.

This Act thus provided many opportunities for cooperation between local authorities and the FBI in the fight against crime. An example of the effectiveness of this cooperation is evident in the case described in the following paragraph.

Some years ago a shipping clerk reporting for work at a Cleveland factory discovered that burglars had entered the premises the night before. Inventory of the stock was taken. The results: \$11,000 worth of high-speed drills were missing! Sometime later Detroit Police reported to FBI Agents that a known "fence" was trying to peddle a quantity of drills. It was very probable that these were the tools involved in the Cleveland burglary. An FBI Agent, posing as a prospective buyer, contacted the man. The hoodlum led the Agent down the steps to a darkened basement. From behind a wooden partition he began bringing out pasteboard boxes containing high-speed drills. After questioning by Agents

"... hoodlums allegedly stole more than a quarter-million dollars worth of precision machine tools."

and local authorities, the "fence" admitted that the tools had been stolen. Furthermore, he implicated the actual thieves, and the case was successfully solved.

In another case a tip from a repairman proved to be the clue needed to halt a series of burglaries of expensive equipment. Preying on a highly industrialized area on the West Coast, hoodlums allegedly stole more than a quarter-million dollars worth of precision machine tools. The items were then sold to various shops. One mistake, however, proved to be their downfall. They had failed to remove the manufacturer's nameplate from a certain piece of stolen equipment. When the machine broke down, the purchaser called in a repairman. He, in turn, recognized it from a description of stolen goods which had appeared in a local police bulletin. Together, local authorities and the FBI began to fit the jigsaw puzzle together. In a short time, authorities had arrested several suspects in the case.

In addition to profiting from tool thefts by peddling them at reduced rates to dealers, these criminals often use the pilfered tools in perpetrating other crimes. In a burglary of a large Eastern concern, the hoodlums, after entering the building, proceeded to the hardware department, picking up several useful tools. With these, the enterprising burglars were able to open several containers of expensive jewelry. Fortunately, though the thieves took full advantage of the accommodations furnish-

ed by their particular victims, their ingenuity did not prevent their eventual apprehension.

In a Southern state, a most unusual motive for the burglary of tools was given. Prison officials became suspicious when they examined a suitcase received by one of the inmates. There, concealed in some old clothes, they found an assortment of cutting tools. Assuming they were intended for a jail break, the authorities kept a close surveillance on the prisoner. But nothing happened. Then the explanation came. The prisoner, dissatisfied with the tools provided in the penitentiary welding shop, had asked his brother to send some better ones. To oblige, the brother stole them from a nearby plant and shipped them to his brother. Needless to say, authorities were not favorably impressed with



"Since the local authorities' jurisdiction stopped at the state line, the fleeing felon often enjoyed the status of the 'untouchable'."

"In the event of theft, it is vital that law enforcement authorities be notified immediately."



"... purchasers of tools are urged to be most wary of nomadic dealers peddling these items at unusual discount rates."

the explanation offered by the prisoner's brother.

As a general rule, hoodlums engaging in these thefts are not mere amateurs; rather they are skilled lawbreakers. Often they are members of well-organized rings involving widespread networks of underworld "fences." Relying on a ready market for equipment and tools at a cut-rate price, these "fences" distribute the equipment to a wide variety of unsuspecting buyers. Through application of clever techniques and a background of criminal experience, these hoodlums present a most serious challenge to law enforcement.

In meeting this challenge we are aware, of course, that prevention of these thefts is the most effective of crime deterrents. To thwart the would-be thief before he has the

chance to ply his wily trade requires the wholehearted cooperation of potential victims of these criminal parasites. Legitimate businesses can help to discourage thefts of this nature by reducing as much as possible the opportunities and temptations to pilfer this equipment.

Sound preventive measures deserve the most careful consideration by firms handling expensive tools. Most important are adequate security measures, such as the frequent changing of locks and fullest protection of keys at all times. Watchmen and guards by their very presence prove to be deterrents to thefts. Employees should also be encouraged to report suspicious persons or activities. *Purchasers of tools are urged to be most wary of nomadic dealers peddling these items at unusual discount rates.*

In the event of theft, it is vital that law enforcement authorities be notified immediately. Physical evidence should not be handled—latent fingerprints and other specimens of evidence not visible to the naked eye have proved invaluable in the solution of many crimes.

The maintenance of adequate stock records is helpful in determining when and where missing goods have disappeared. Recording serial numbers on expensive tools is of great value in tracing stolen items. The publication of these numbers in police bulletins and trade periodicals has proved to be helpful in identifying stolen property. Also, the FBI maintains a special file on serial

numbers of expensive tools known to be stolen.

Combating the criminal craftsmen who specialize in tool thefts requires the diligent assistance of all law-abiding individuals. Through alertness and cooperation we can do much to thwart the parasites who prey on legitimate business.

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Safety Training Films

The National Safety Council has announced the release of a series of four training films entitled "Communication for Safety." Said to provide a fresh, realistic solution to the ever-present problem of communication, the films use everyday supervisor-worker situations, plus an effective combination of live-action photography and clever animation to achieve maximum believability.

Available either individually or in a series of four, the films come in two sizes—16 mm. sound motion picture and 35 mm. sound slide film. Further information on "Communication for Safety" may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.

★ MODERN MACHINE SHOP ★

ASTM Standards on Metal Powders and Metal Powder Products. First Edition. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 96 pages, 6 x 9 inches. Hard cover. Price, \$2.25.

The standards making up this book cover metal powders, bearings, structural parts, carbides, heavy metals and terminology relating to powder metallurgy. In addition to

the 23 standards, a general description of production processes, mechanical properties, and uses of metal powder sintered bearings and structural parts is included as an appendix to the compilation. This information provides an important preface to a group of specifications covering structural parts.

A second appendix provides a cross index to the standards of other organizations such as the Metal Powder Industries Federation (MPI), Society of Automotive Engineering (SAE) and federal agencies, including the military. Reference is also made, in the Table of Contents, to other ASTM test methods, not included in the compilation, that can be used for determining mechanical and physical properties not specifically defined in the B-9 methods.



Design for a Progressive Die

Discussion covers construction and operating details of three-station five-operation progressive die for automatic lighter part.

By RUSSELL KINDT

The tool described in this article is a three-station, five-operation progressive die which was designed to produce the part shown in the enlarged view *E-E*. The part is a bottom section for an automatic cigarette lighter.

The stock is soft copper, 18-gauge (0.047 inch), $1\frac{5}{8}$ inches wide. For very large production this die could be fed from a coil unwinding from a U. S. Tool Company multi-roll cradle (see page 51, October, 1959 issue of *Modern Machine Shop*) or a similar cradle and feeding through a stock straightener which eliminates the "coil-set" or tendency to bend. The stock is drawn through the straightener by means of a slide feed which will accurately feed the stock to the die at a rate of up to 4,000 pieces per hour.

The progress of the operation is as follows: To arrive at the first station, indicated at *B*, the operator pushes the stock locating gage (1) in, which is done by hand. He then feeds the end of the stock against this gage. The press is then tripped, the stamping punch (2) stamps the legend (in this case consisting of the patent number and date) on the stock as shown in the enlarged view of the finished part *E-E*, completing the

first operation. The operator then releases the gage (1).

For the second station, *C*, the operator pushes the stock gage (3) in and feeds the end of the stock against the gage. The press is then tripped and the punch (4) pierces a 0.062-inch hole in the stock. The press operator then releases stock gage (3).

For the third operation, indicated at *D*, the operator feeds the end of the stock into contact with the automatic gage-pin (14). The press is then tripped and, as the punch holder moves down, the punch (6) enters the 0.062-inch hole and extrudes and sizes the hole to 0.078-inch diameter for a No. 3-48-thread tap. The tapping operation is performed later.

The punch (6) is 0.032-inch diameter at the end and is tapered to 0.078-inch diameter at the shoulder as shown in the drawing *F-F*. The punch enters the hole in the stock before the blanking punch (7) has touched the stock, which ensures that the stock will be positioned properly regardless of any slight variation in over or under-feeding due to wear in the stock guides (12).

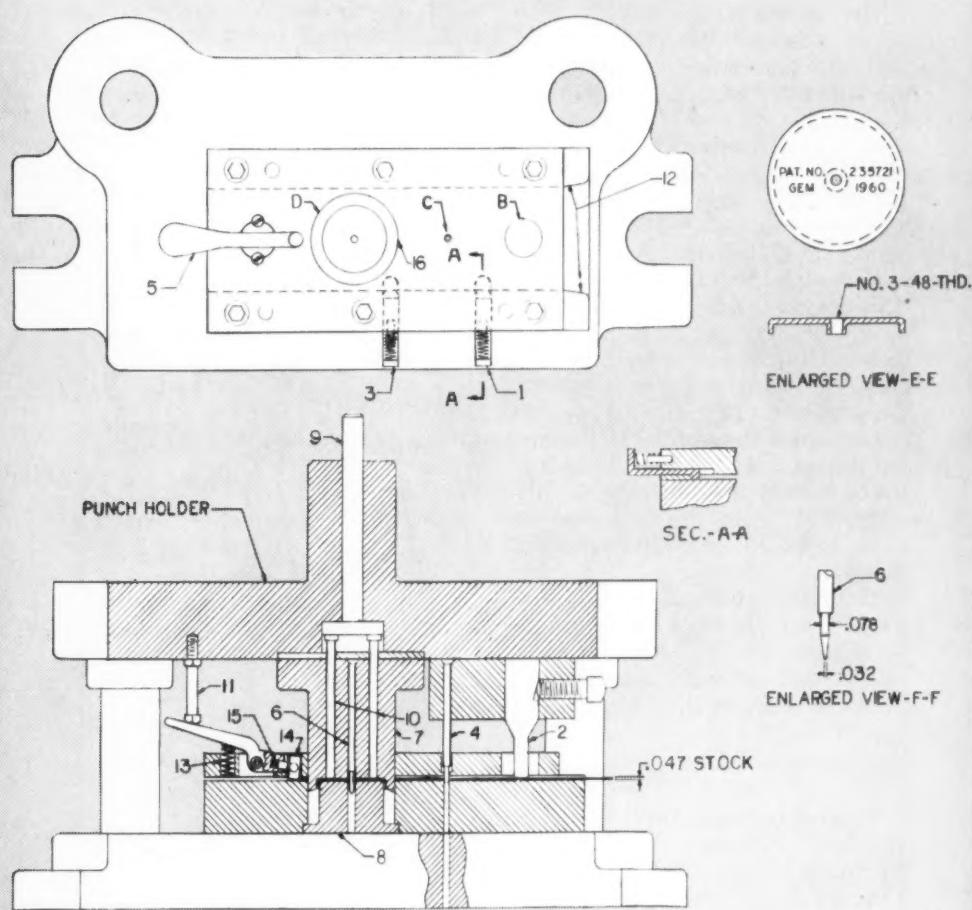
In the fourth operation, the punch holder continues to move down and the blanking punch (7) pierces the

stock, producing the blank. The blanking punch continues down until the stock is formed over the forming die (8), thereby performing the fifth operation.

As the punch holder moves up, the part is carried with it, remaining inside the blanking punch (7). The

knock-out bar of the press contacts knock-out pin (9), which in turn moves down and pushes knock-out pins (10) down, freeing the piece from the punch.

Either of two methods can be used to remove the finished piece from the press: the press can be inclined, al-



Progressive Die . . .

lowing the pieces to fall clear of the bed and into a chute through which they pass into a container, or an air-stream can be directed to blow the piece into a chute and thence into a container.

The operation of automatic stop (5) is as follows: The operator feeds the end of the stock into contact with the gage-pin (14). The gage-pin is a $\frac{1}{2}$ -inch section of $\frac{1}{4}$ -inch round stock into the side of which a hole has been drilled for the ball-joint. The ball is $\frac{1}{8}$ -inch diameter, and the hole is large enough to allow approximately $\frac{1}{32}$ -inch play in the hole.

The set screw (11) in the punch holder is adjusted to strike the stop lever (5) at approximately $\frac{1}{16}$ inch before the die is in the closed position. As the lever is depressed, the gage-pin (14) is lifted clear of the stock and the spring (15) pushes the gage-pin (14) against the side of the hole. On the upstroke, as the spring (13) raises the lever gage-pin (14) is pushed down onto the top of the stock.

From this point on, the edge of the hole in the stock made by the blanking punch (7), shown at (16), will be fed against gage-pin (14) (until the strip of stock has run out).

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Tool Engineering. By S. E. Rusinoff. Published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. 326 pages. Illustrated. Cloth binding, board covers. Price, \$6.75.

Intended for the purpose of further-

ing the training of tool engineers, this book defines the responsibilities of the tool engineer which include (1) planning the processes of production, (2) developing the tools, and (3) completely integrating the facilities of manufacture.

The author thoroughly covers the analysis and comparison of costs which are necessary in selecting the tools, equipment and processes best adapted to the product and to the future plans of the manufacturer. He views such areas as tool design, estimating, dimensions and tolerances, and quality control from the tool engineer's position. Dangerous practices and handicaps which must be fully overcome are clearly listed.



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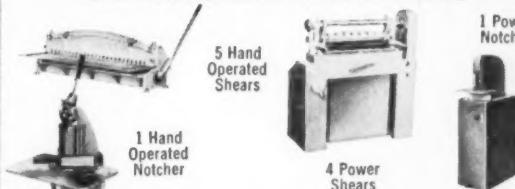
ROLLERS



8 Hand Operated Models



6 Power Models

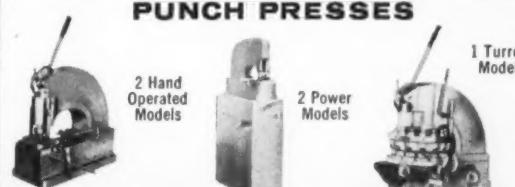


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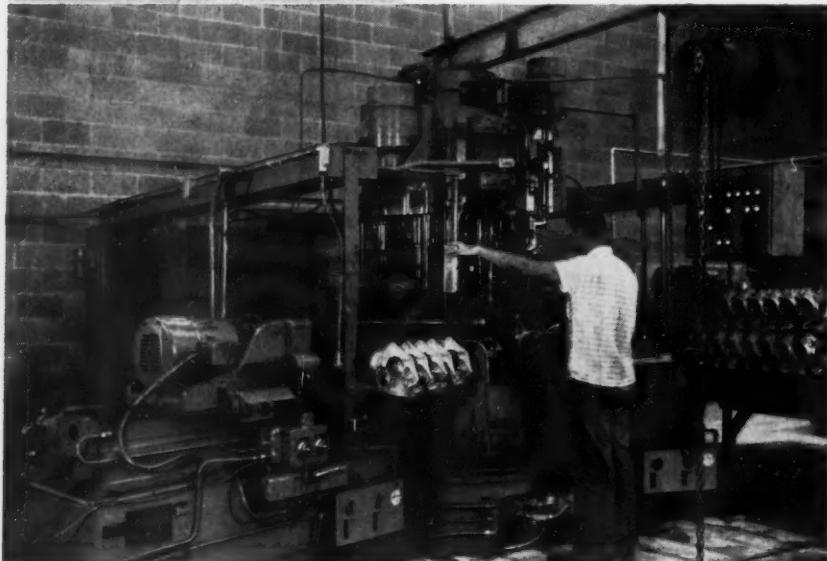
Automatic Production of Compressor Components

29 automatic operations are performed on each part.

By IRA S. ROBERTS

High production without high cost is the achievement of the General Electric Company in the manufacture of air conditioning compressors at its Tyler, Texas, plant. Drilling, milling, facing, boring, reaming and tapping operations on compressor components are currently being performed by three high production machines. These machines are utilized in the processing of crankshafts, motor and bell housing assemblies and cylinder frames.

Largest of the machines, designed and manufactured by The Morris Machine Tool Company, Cincinnati, Ohio, is a five-station rotary index center column machine with a 48-inch diameter table. It is utilized to automatically face, bore and tap either single or double cylinder



This five-station rotary index center column machine automatically faces, bores and taps single or double cylinder frames. Note how

drill units are compactly mounted both horizontally on bases adjoining indexing table and vertically on center column for access.



(Right) Unfinished double cylinder frame.
(Left) Finished part after 29 automatic operations have been completed thereon.

frames for the air conditioning compressors. Production rate is 0.87 minute per piece, including loading.

The 29 spindles involved are mounted on three 12-inch way-type units and four Air-Oil-Matic drill units. Each of the standard Morris units has independent feeds and speeds, permitting adjustment without affecting the entire machine. For instance, the General Electric Company utilizes speeds from 215 to 1,364 r.p.m. and feed from 0.005 to 0.05 i.p.r. simultaneously.

Substantial initial savings were achieved on the five-station machine by the economical design which cycles parts twice around the table, thus reducing the number of units required. Double fixtures are utilized; with each indexing, the operator removes a completed part from the second (transfer) position of the fixture, transfer a part from the first (load) position to the second position and then loads an unfinished part in the first position.

Full capacity of the drill units is utilized by designing three of the slide units and one Air-Oil-Matic to

machine cylinder frames in both the load and transfer positions at the same time. Tolerances of from 0.003 to 0.005 inch are held on the boring operations of the cast iron and aluminum parts.

A second Morris high production machine, equipped with a fixed-position fixture and five Air-Oil-Matic drill units, drills and mills crankshafts. Two parts at one time are processed, with a production rate of 0.82 minute per piece of cast iron and 1.25 minutes per piece of ductile iron. This includes loading, indexing and unloading. A total of 18 operations is performed.

The third Morris machine at General Electric originally drilled $\frac{1}{4}$ -inch holes in compressor motor and bell housing assemblies for drive



Here is clearly shown the double work-holding fixture involved in cycling parts twice around the table for increased economy.

Automatic Production . . .

pins. The unit-type machine was composed of three single spindle Air-Oil-Matic units and a fixture mounted on a common fabricated steel base. The unit-type construction has since made possible change-over of the machine for different production. It has been modified to two spindles with a rotary fixture table, and is currently being utilized for new product designs.

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Part Design Change Saves Manufacturing Costs

A suggested design change of a compressor valve mounting flange being contract-manufactured by Detroit Stamping Company re-

sulted in manufacturing process changes that brought welcome savings to the customer. The change originated with D. J. Damm, De-Sta-Co plant manager, who was reviewing all of the then current jobs in the division in an effort to cut manufacturing costs so that the resulting savings could be passed on to the customer. He determined that the part could be produced in a complete fabrication, thereby eliminating the need for a purchased component and an extra assembly operation.

The flange's in-use and assembly requirements call for a shoulder extension on one side and a neck extension on the other, with diameters and bores concentric with each other. To fill these requirements, the part was originally designed with a separate machined button that was fitted into the flange body. The manufacturing process employed to produce the part

FIG. 1

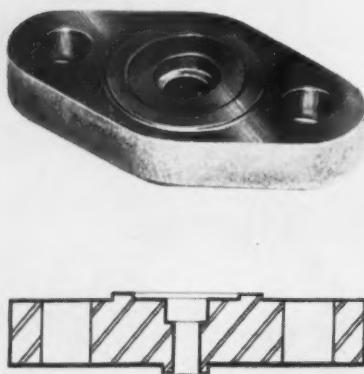
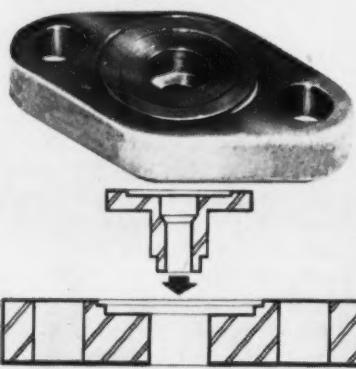


FIG. 2



(Fig. 1) Making shoulder and neck extensions an integral part of the flange body resulted in manufacturing process changes that allowed producing the completed flange in one progressive stamping operation, resulting in

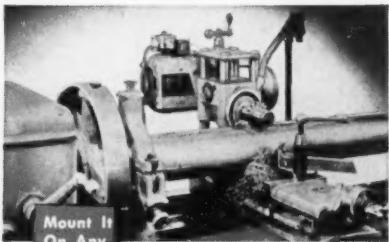
savings. (Fig. 2) Original design of compressor valve mounting flange used a screw-machined button that was press-fitted into the flange body in order to produce the necessary shoulder and neck extensions.

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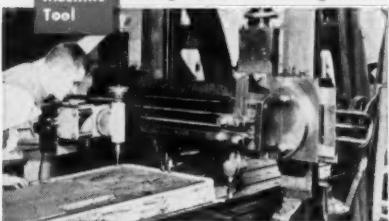
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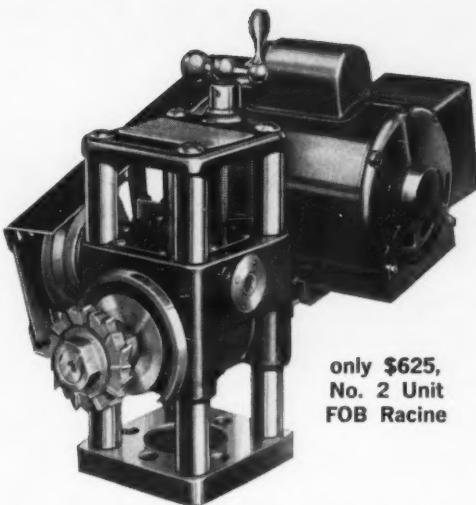
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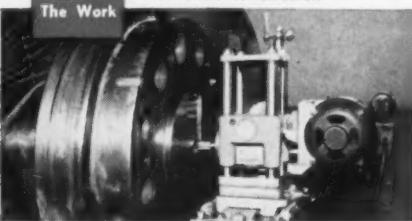
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Flange manufactured in one complete progressive stamping operation fits onto compressor valve to allow mounting and locking the valve into the required position.

stamped out the flange body with a separate screw-machining operation used to make the button. The button was then press-fitted into the body to produce the required shoulder and neck extensions.

The new design suggested by Damm made use of coining techniques developed by De-Sta-Co that allowed making the shoulder and neck extensions an integral part of the flange body. The job was then re-processed into a single progressive stamping operation that produced the completed mounting flange within the original tolerance specifications, saving the customer the cost of a separate screw-machined shoulder button and an extra press-fitting operation.

★ MODERN MACHINE SHOP ★

Screw Machine Products Buying Directory. A new edition of its Buying Directory, covering the location and facilities of its member companies, has been published by the National Screw Machine Products Association. The 1959-60 edition contains 80 pages and is

designed to assist buyers in quickly locating sources of supply for their screw machine product requirements. More than 270 companies in 25 states are listed.

Of particular importance is the listing of facilities for each of the NSMPA member companies. This listing covers primary equipment, including the type and size range of machines available for contract work; types of materials machines; secondary operations available; information covering the particular field or product in which the company has concentrated its manufacturing operations; and any end products also made by the company.

The Directory is available to buyers of screw machine products by request, on company letterhead, to National Screw Machine Products Association, NSMPA Bldg., 2860 E. 130th St., Cleveland 20, Ohio.



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SAFETY IS NO ACCIDENT

Safer working conditions require constant vigilance of every person in the plant.

By CLYDE F. SCHLUETER
Accident Prevention Manager, Employers Mutuals
of Wausau, Wausau, Wisconsin

If safe working conditions are to be achieved and maintained in the metalworking plant or department, it is imperative that a periodic examination of accident causes be made. Now just a short month away since we entered the decade of the sixties is an excellent time to take a long and specific look at some of the safety problems which may be ahead.

It takes time to try and anticipate future safety problems, and to try and prepare for them. I thought that the best way to get a good look at metal working shops safety problems in the sixties was to persuade the member of The National Safety Council executive committee to do a little forecasting of their own—as to the major problems they feel that

they will encounter, in preventing accidents and occupational disease through the next decade. I received many interesting responses, and I will now give you the substance of these, along with information I have obtained from other sources.

Spearheading the avalanche of new industrial materials are chemicals, many of which will continue to find uses in your metal working shops. Chemists can produce and put into use a dozen new products, in the time that it takes industrial hygienists to lay out a research project to test the toxic qualities of just one of these new products.

To protect the growing numbers of workers exposed to industrial chemicals, we must develop more efficient methods of evaluating

"... new methods and processes—and hazards—are the result."

toxicity, and we must learn to predict with greater accuracy the effects of long-term exposures. Another need is to develop a central source of information on the toxicity of chemical compounds, as well as on hazards associated with new processes, and control methods.

We are more and more coming to realize that diluted amounts of certain toxic materials breathed over a long period of time may have harmful effects as surely as more concentrated amounts breathed over a shorter time period.

No doubt about it—new chemicals of unknown toxicity will be introduced to industry at an ever-accelerating pace—and this will be one of your major problems of the sixties.

As rare or comparatively rare metals continue to be introduced to the metalworking industry, new hazards will arise with their working and processing.

Expanded uses will be found for magnesium—and this will mean increased fire hazard. The increasing use of alloy metals will be a matter for concern. They will have greater strength, reduced weight, and characteristics of high heat resistance. New methods of compounding, preserving and finishing materials and machine shop products will increase such hazards as toxicity, flammability and radiation, and will probably bring unsuspected new dangers.

Welding methods are expanding by leaps and bounds. Each year brings new techniques and new hazards. Spray welding and atomic welding will add their share of control problems. Ultra-violet light

emission from inert gas arc welding operations is a specific hazard for which controls are now being sought. Tests are being conducted by several experimenters on the absorptive properties of various paint coatings, in an effort to minimize exposure to ultra-violet light radiation.

Science is on the march—and new methods and processes—and hazards—are the inevitable result. A recent example is a torch that is three times hotter than an oxyacetylene flame. The new process uses plasmagas at such high temperature that it consists of ions. Nitrogen is forced through an electric arc in a constricted space. The heat of the arc breaks down the gas molecules into ionized atoms with high energy content. The result is plasma, which is used as a jet flame as it is ejected from the torch. What are the safety implications of such a process? This question highlights the problem that



"... new chemicals will be introduced to industry at an ever-accelerating pace . . ."

"Shell molding will create a number of safety problems."

industry faces: the usual lag between the creation of new methods and adequate safeguards for those who put the methods to use.

Shell molding is a method in foundry operations that will be greatly on the increase, and it creates a number of safety problems. One method of coating sand for shell molding involves the blending of sand, resin and alcohol in a muller. To speed up the operation, the alcohol in the mixture is driven off by heat. This may result in the alcohol vapors reaching the explosive range, especially after the heat is first applied. Ventilation of mullers normally recommended for dust control is not sufficient to dilute the alcohol vapors to the safe range. The exhaust volumes must now be based on the amount of alcohol used.

Increasing use of the shell molding method has also greatly increased the need for safe alcohol storage. In

one foundry, three 55-gallon drums of isopropyl alcohol were stored within 8 feet of sand molds. A man prepared to dry the sand molds with a propane gas torch. The torch flames must have contacted one of the partially-filled drums. This resulted in an explosion of such force that the drum wrapped itself around an I-beam near the ceiling. The worker enveloped in flaming alcohol, died instantly.

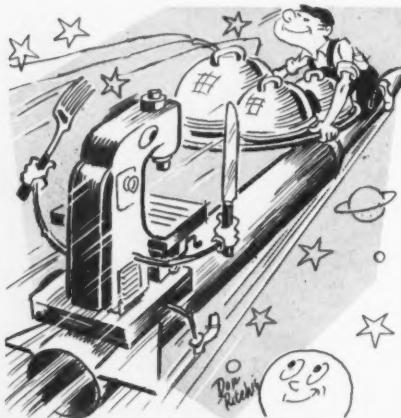
The precaution is obvious: store alcohol in closed containers, safely away from flames and sparks!

Other problems foreseen in machine shop methods and processes are: higher machinery speeds and heavier feeds—new coolant and cutting oil problems—increased use of resins, plastics and adhesives, synthetics such as zirconium and teflon.

Another subject worthy of mention in the on-rush of new industrial methods is that of centrifugal casting, which has gained prominence in recent years. As you probably know, molten metal is poured into a rotating mold which is then spun while the metal solidifies.

During this process in one foundry, the metal within the spinning form began to leak, and the bolts holding down the cover plate of the centrifuge then ruptured, and 4,000 pounds of molten metal was flung over nearby workers. Two died, and five were severely burned. We cannot emphasize enough the need for new and adequate safety controls, as new methods are put into effect!

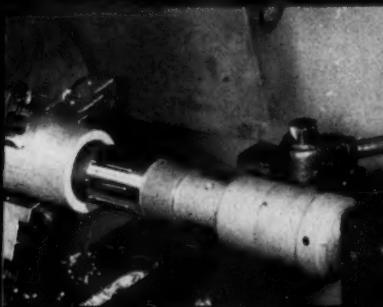
In recent years, several states have ruled or legislated that hearing loss



"Other problems foreseen in shop methods are higher speeds and heavier feeds . . ."

**roughest part surfaces
finished to 4 micro in. or less**

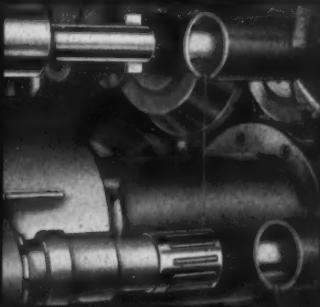
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"Operations will become much more complicated . . ."

due to industrial noise exposure is compensable under workmen's compensation law—and this trend will undoubtedly continue through the sixties. More intensive efforts will have to be exerted to reduce noise exposure through design of machines and equipment and other engineering controls, and through the wearing of hearing protective devices. Pre-placement hearing measurements, sound level surveys, research in noise reduction, and better planning for noise control in future equipment and factory arrangement must be emphasized in the years ahead in order to stay on top of this particular problem.

Automation will be a growing problem in the sixties. Larger machines and multiple operations controlled by one or two operators create new problems. Employee selection for such jobs becomes a little more difficult. Safety controls to substitute for the empty work stations formerly

filled by other operators must be developed to operate automated machines safely and efficiently.

Operations will become much more complicated with magnetic tape directing the operational sequence of many machines and transfer devices. Any malfunction of this intricate control center may result in hazards for operating or repair personnel.

The maintenance problems for the equipment of automation will be multiplied manyfold because of the pressure that will be exerted to get equipment back into production. Special procedures that will provide maximum safety and reduce down time must be developed and clearly set forth.

It is estimated that 175,000 persons are currently employed in atomic energy industries. Thousands of other workers are engaged in operations involving the use of X-rays, isotopes, and other radioactive sources. And this rapid recent growth in the number of workers dealing with radioactive materials is nothing compared with the growth we shall see in the immediate years ahead.

We must learn far more about the health hazards to the workers involved and develop more effective control measures. Whether radiation in your industry is used for the X-ray examination of welds or castings, or for other expanding uses in the future, you must be prepared with complete controls. This is particularly important, because there are two unusual aspects of radiation damage: 1. Complete failure of the human senses to warn of the presence of radiation in any quantity. 2. No



"Automation will be a growing problem . . ."

Q

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"We must make sure that our safety standards are up to date."

constant clinical symptoms have yet been identified which reliably warn of latent radiation injury, which injury may not show up for months or years. Thus we must rely completely upon instruments for the detection of radiation and medical examination for the control of individual health.

The problem of updating safety standards is also a prominent one. More and more states are becoming codified, and using American Standards as their guides. We must make sure our safety standards are up to date, and that new standards are developed as needed.

Many of us are convinced that we shall be able to develop safety controls for our physical hazards, no matter what exotic materials and complex equipment and methods come our way. But one of our greatest problems of the sixties will be one that has always been with us—that of better understanding people, and the things that make them tick. Better techniques for education and motivation will always be the need of the hour!

The major portion of our accident problem has always been rooted in employee attitude. It isn't enough to educate. As that well-known safety film puts it, "Knowing's Not Enough." Of course we must see to it that employees know, but that's only the beginning. We must then see to it that employees use what they know, to enable them to perform their work safely and well.

Last but not least, the safety man will have to grow to keep up with the changes that have come and will continue to come. He must ex-

tend his knowledge by reading the periodicals of his trade, by attending conferences and seminars, by doing everything possible to keep in step with the march of progress. If he fails in this—if he allows himself to go stale—he will be lost in the shuffle.

Now we are in "The Soaring Sixties." Are we going to soar with these changing, challenging times? Let's remember that it requires effort and study to keep abreast of the times. As someone aptly put it: "You have to run to stay even; you have to run fast to progress!"

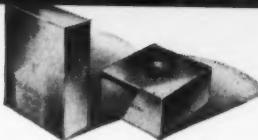
Let's be as keenly aware of the promise in the Sixties, as we are of the problems. The industrial revolution that swept in with steam and electricity was a tremendous advance; yet scientists are confident that the titanic team of electronics and atomics will bring greater advances than we have yet dreamed of.

No doubt about it—this decade



"Major portion of our accident problem has always been rooted in employee attitude."

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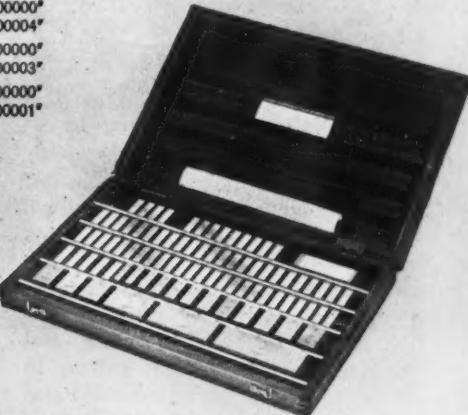
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No. 85-R. Left: Ellstrom Square
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Safety Is No Accident . . .



"No doubt, this decade will be a great show and we've got front row seats for it."

will be a great show, and we've got front row seats for it. This nation's potential is beyond measure—and so is its need for new materials, new methods, new ideas—Yes, there is great reason to soar in the Sixties with all the power of mind and muscle and spirit; great reason to keep alert and alive, able-bodied and at peak capacity, not merely to enjoy the show—but to move on stage, get into the act and help make the show come out right!

(Editor's note: The foregoing was presented as a talk at the recent National Safety Congress.)

★ MODERN MACHINE SHOP ★

Castings Producers Buyers

Guide. The first comprehensive Buyers Directory dealing exclusively with the purchasing needs of America's 6,085 metal castings producers has been published by the

American Foundrymen's Society, Golf and Wolf Rds., Des Plaines, Ill. Developed over a period of three years, the directory classifies all major sources of supply for the nearly 2½ billion dollars spent annually by the industry for materials, equipment, supplies and services.

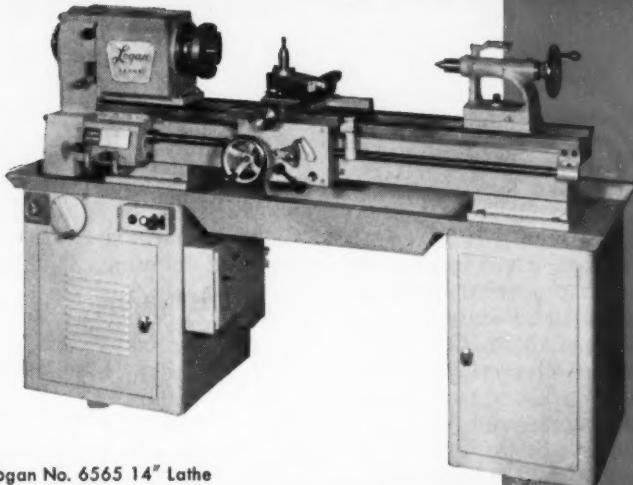
First edition of the new reference book contains over 300 pages and classifies over 1,000 products available from over 1,600 major supplier firms, and their local and regional sales representatives, dealers, jobbers and agents. The book, which will be issued every two years, also identifies nearly 3,300 trade names of products. A special section locates 41 foundry supply houses and the myriad products they warehouse for immediate availability.

Another feature of the directory describes the many activities of the 12 major associations serving the castings industry as members of the National Castings Council, organized in 1946. Copies of the AFS directory are being distributed to every cast metals plant in the United States and Canada, to schools and colleges teaching foundry and patternmaking courses, to U. S. military establishments and to over 100 U. S. foreign service posts in countries with important manufacturing facilities. It is expected that the book, available to anyone interested at \$10.00 list, will soon be in wide use throughout the world.



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Logan No. 6565 14" Lathe

Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

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- 1½" Levermatic collet chuck capacity.
- 14½" swing over bed.
- 9" swing over saddle cross slide.
- 40" between centers.

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MORE PRODUCTION

Gang-Milling Slots in Comb Bars

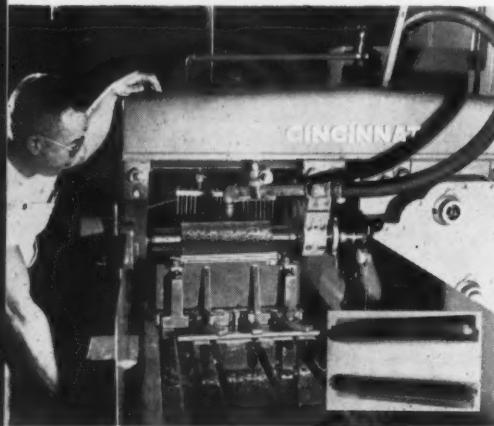
Ferritic malleable iron comb bars acting as pivot points for levers in date processing machines are produced at the Federal Systems Division plant of International Business Machines Corporation in Kingston, New York. Each comb bar has 121 slots, averaging $\frac{5}{8}$ inch deep and 2 inches across. Slots in the comb bars are dimensioned to $0.043 + 0.003$

—0.000 inch, holding the overall slot relations to within ± 0.002 inch and inclusive taper of 0.002 inch. IBM Kingston sought greater production speed and uniformity than individual machining offered.

Now, 121 carbide-tipped, $4\frac{1}{8}$ -inch diameter 20-tooth Gay-Lee "thinsaws" are used at the IBM plant. Manufactured by Gay-Lee Company, Clawson, Michigan, these saws feature tips set in circular seats for greater strength at the root. Although not required on the IBM comb bars, the saws are capable of cutting to 0.001-inch tolerances. The ganged saw blades are set radially at random to eliminate chatter and reduce horsepower requirements.

By changing to gang-milling with Gay-Lee tungsten carbide "thinsaws," IBM obtains feed rates of 1 inch to $1\frac{1}{2}$ inches per minute, depending upon the design of the bar and the holding fixture. All slots are cut to full depth in one pass. For optimum production and tool life, the ideal speed range of the "thinsaws" on a horizontal type milling machine is maintained between 280 and 358 revolutions per minute (300-390 f.p.m.) according to the comb bar design.

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Setup used at IBM Kingston for gang-milling 121 slots simultaneously in ferritic malleable iron comb bars of type shown in inset.

THROUGH MODERNIZATION

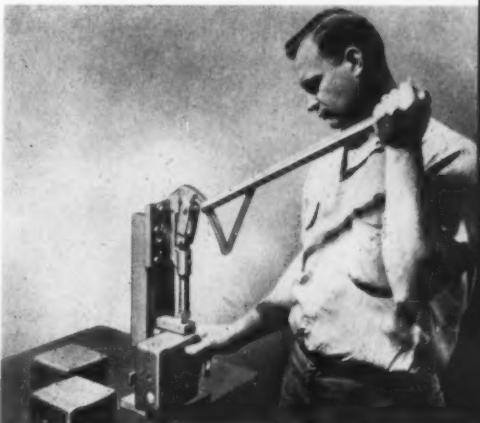
Toggle Clamp Makes Economical Hole-Piercing Press Setup

In an effort to cut electrical relay case manufacturing costs, Roy W. Woodworth, shop superintendent at B/W Controller Corporation, 2200 East Maple Road, Birmingham, Michigan, used standard sections of steel usually found on any shop steel rack and \$19.00 out-of-pocket costs to come up with a method that produced surprise savings. From this steel and a Model 650 heavy duty plunger-type toggle clamp manufactured by Detroit Stamping Company, Woodworth built up a simple hand "press" that eliminated drilling and deburring operations used for making mounting holes in relay cases. The press helped in cutting production time from over eight hours to a job that is now completed in 45 minutes to an hour.

B/W Controller Corporation manufactures electrical relays, switches, industrial and liquid level control systems. The cases used for housing relays and switches are fabricated with cut-outs for electrical outlets from 16-gauge steel. Mounting hole location and size vary with individual

requirements. Holes are put in only after the case is fabricated and a protective coating applied. Production quantities on these specially pierced cases are usually around 100, now less than an hour's work. Not only was the former method—a job taking over eight hours—costly but it also produced undesirable scrapage by chipping the protective coating. The new hand press also eliminated the chipping problem.

In building the hand press, Wood-



Simple hand press operation reduces time required to produce two mounting holes in relay cases from 8 hours to about one hour.

more production . . .

worth welded a handle extension and support braces on the toggle clamp handle and mounted this on a steel block supported by short columns. The required punch is screwed on the plunger and the die button is in a locator block that also serves as a platen to support the case when the hole is being pierced. Hole location is determined from the relay case edges and the locator serves as a quick and easy means for doing so.

Each relay case requires two mounting holes of either a 9/32-inch or 13/32-inch diameter. Although the De-Sta-Co Model 650 heavy duty toggle clamp has a rated holding pressure of 4000 lbs., the calculated force generated in piercing these holes exceeds 5000 lbs. The whole unit is light enough to be carried around to different locations as desired. It can be either bolted or clamped on a portable table or bench,

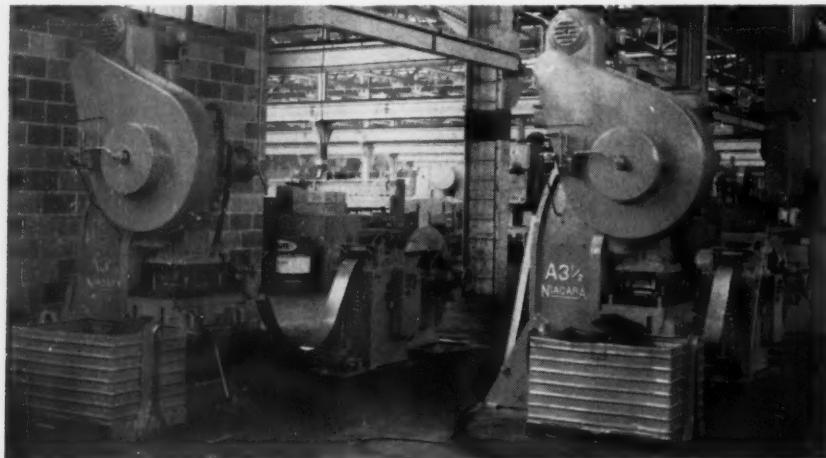
wherever it is most convenient. To keep the handle extension from protruding when the press is not being used, a heavy duty spring is slipped over the punch. This keeps the handle in a raised position.

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★ modern machine shop ★

Friction Clutch Presses Reduce License Plate Production Costs

Two Niagara friction clutch type OBI presses, placed into operation in 1959 at Auburn State Prison, Auburn, N. Y., will have paid off their cost and saved about \$50,000 in addition before the end of the first year, according to an announcement made by Niagara Machine & Tool Works. The presses, furnished as automatic packages complete with progressive dies, feed, stock straightener and reel, are saving New York



Niagara friction clutch type OBI presses under test shipment to Auburn State Prison.



58-19

Greater Accuracy—with Ex-Cell-O Precision Boring Spindles

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Produced in belt-driven, standard motorized, or high frequency motorized styles,

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more production . . .

State the equivalent of 500,000 license plates in scrap in the annual production of 12,000,000 plates which involves the processing of 6,000,000 lbs. of steel.

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ting them into 12 3/32 inch lengths, and hand feeding them into several OBIs for punching holes and cutting corner radii in two separate operations. Using coil stock ordered to correct width, the two Niagara presses perform identical piercing, corner trimming, and parting operations with two-stage progressive dies.

In addition to material savings approximating some \$80,000 annually, considerably less floor space is required by the new equipment, less work must be carried in process, fewer operators are required, hazards to exposure have been reduced, and the quality of work has been improved, according to Niagara Machine.

Based on 100 strokes per minute, eight hours per day with 80 percent efficiency, the two machines are capable of piercing and blanking 78,000 plates per day, for an annual production of 18,000,000. The presses are identical, each with a capacity of 50 tons.

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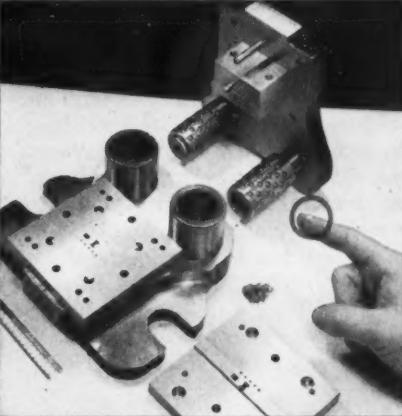
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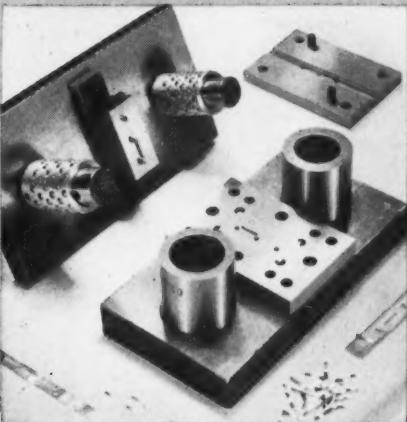
To the best of our knowledge, Lempco is the only 2-post STOCK* die set which could produce this electronics part from .001" thick high nickel alloy material—with punched holes of .001" diameter. This die, mounted in a standard Lempco STOCK* die set, produced 30,000 burr-free parts on its initial run.

Users everywhere have found that a STOCK* Lempco 2-post die set will out-produce special 4-post "friction type" sets—at a fraction of the cost. You can prove this to yourself!

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MATERIAL: .001" Thick, High Nickel Alloy
Punched Holes, .001" Diameter



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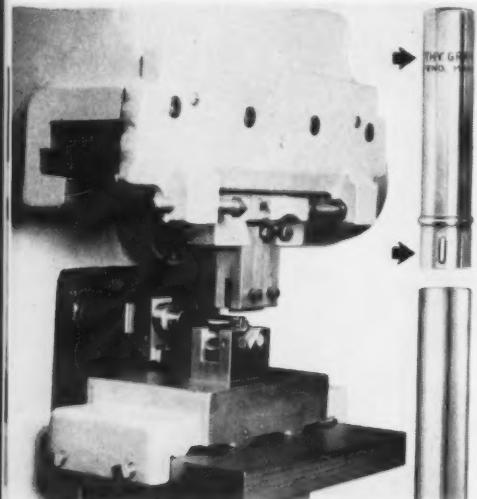
Tel. MOnrose 2-2400 — Cleveland Exchange

more production . . .

Production Setup for Marking and Embossing Cosmetic Shells

Adaptation of the Noblewest Series 50 general purpose marking machine to perform both a marking and an embossing operation on a brass eyebrow pencil shell has been announced by Noble & Westbrook Manufacturing Company, East Hartford, Connecticut. Through the use of special tools, one set for marking the trade name and another set for embossing or forming ribs to hold the mating brass cap snugly in position, a leading cosmetic shell manufacturer's production problems have been minimized.

The Model 50P1-517 machine



Setup used by leading cosmetic shell manufacturer for performing marking and embossing operations on brass eyebrow pencil shell.

utilizes a roll marking principle wherein a flat die is used to mark a round shell. The shell to be marked is placed over a mandrel in a specially designed work-holding fixture mounted on the machine table, and the table elevates pneumatically, bringing the shell into contact with the marking die, which then traverses the shell and marks it. A hole in the mandrel permits an air blast to eject the shell automatically after completion of the marking stroke.

The separate roll forming operation, which produces the three embossed ribs running axially at 120-degree intervals, requires the use of male and female forming tools. The mandrel, over which the shell is placed, becomes the male die, with three raised ribs. A female die, with three sunken cavities, is mounted in the die slide. Mandrel and flat die are synchronized through a rack and gear arrangement. As in the former operation, the mandrel has a hole for automatic air ejection.

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★ modern machine shop ★

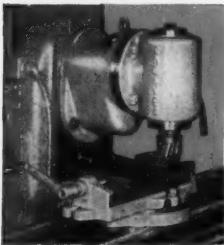
Precision Boring of Aircraft Parts

A Style 17-A precision boring machine recently supplied to the aircraft industry by Ex-Cell-O Corporation, Detroit, Michigan, bores several varied holes in two totally different magnesium castings. By careful fixture design it was possible to accommodate batches of the two different castings on the same machine, using to advantage a closely similar setup.

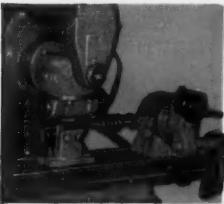
The accompanying illustration shows a close-up of one of the com-



Heavy Duty Vertical
Milling Attachment



Heavy Duty Offset
Vertical Milling Attachment



Universal Milling Attachment



Toolmakers Overarm

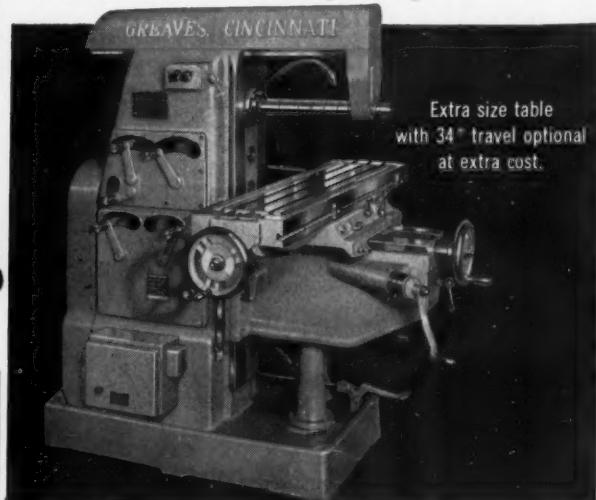
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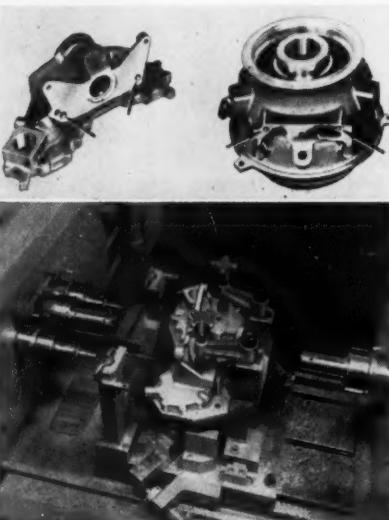
The advertisement features a large black and white photograph of a claw hammer in the upper left corner. To its right, the word "the" is written in a cursive script, followed by "number" in a bold, sans-serif font. Below "number" is a large, bold "I". To the left of the hammer is a circular seal with the words "CONTINENTAL DRILL CORPORATION" around the top edge and "WEST EDITION" at the bottom. The main headline "LOWER COST PRODUCTION" is written in large, bold, sans-serif letters across the center. Below it, the company name "CONTINENTAL DRILL CORPORATION" is also in large, bold letters, with "CORPORATION" in a slightly smaller font. The address "555 W. Adams St., Chicago 6, Illinois" is printed below the company name. A section titled "WAREHOUSES:" lists locations in New York, Los Angeles, Tacoma, Wash., and Boston. At the bottom, there is a large "FREE" offer for "4 PERMANENT TIME-SAVING CHARTS".

more production . . .

ponents, located and clamped in the fixture. Cycle commences with the table advancing toward the left. Here one large hole is finish bored, counterbored and faced, while two smaller holes are finish bored and chamfered. Hole diameters are held to 0.001-inch tolerance and locations held to 0.0005 inch of true position.

Retracting from the left end of the machine, the table automatically advances to the right. Here a precision boring and chamfering operation is completed on the opposite side of the casting.

Two dowel holes are precision bored in batches of the larger, round-bodied casting in a similar manner.



(Above) The two different magnesium castings precision machined on the Ex-Cell-O Style 17-A boring machine. (Below) Close-up of machine, showing the fixture that is designed to take the two different castings.

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158 MODERN MACHINE SHOP

Want to Cut DRILLING COSTS?



with a

Get
INCREASED PRODUCTION
IMPROVED QUALITY
LONGER TOOL LIFE

Bellows DRILL PRESS FEED

Automatic or semi-automatic feeding of drill press spindles is practical for short runs as well as long with the Bellows Drill Press Feed. Attaches quickly to the star wheel shaft of any drill press. A touch on the starting control handle advances the drill rapidly to the work, hydraulically feeds through the work, automatically returns spindle to start position. Air-powered (operates on any air pressure between 15 and 150 lbs.), electrically controlled. Precision hydraulic feed is quickly adjustable to any tool working in any material. Can be moved from one drill press to another in minutes.

656-C

Get complete specs on the Bellows Drill Press Feed. Write today for free Bulletin DF 110R. Address Dept. MMS-260, The Bellows Co., Akron 9, Ohio.

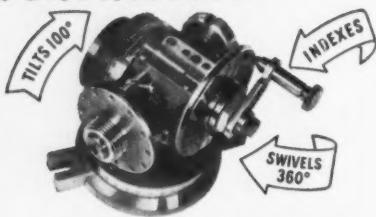
The Bellows Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co., Valvair, Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio

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VERSATILITY



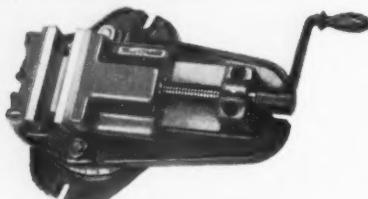
DIVIDING HEADS

6½" or 8" swing

Swivels in 2 planes

Holds work between centers,
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5" MACHINE VISE

Plain or swivel base

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V-slides with adjustable gibbs

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Save time and money with
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CORPORATION

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160 MODERN MACHINE SHOP

more production . . .

High Speed Cutting of Bar Stock

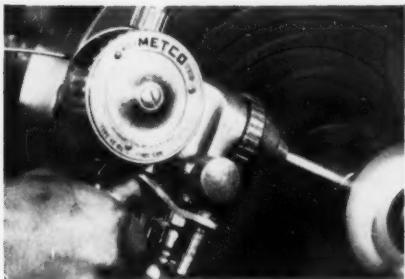
The Precision Screw Thread Company, Milwaukee, maintains a rate of 2,000 cuts per hour on smaller lengths of bar stock with a Di-Acro Power Rod Parter, product of O'Neil-Irwin Manufacturing Company, Lake City, Minnesota. The machine is used for copper, brass, cold rolled steel and stress-proof bar stock up to $\frac{5}{8}$ -inch diameter in lengths from $\frac{5}{8}$ to 36 inches. Tolerances of 0.115 inch are easily held.

The Rod Parter replaces a piece of equipment requiring a different setup for each different type of rod.

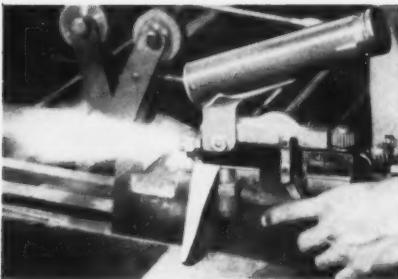


Machine used at Precision Screw Thread Company for cutting smaller lengths of bar stock at a rate of 2,000 cuts per hour.

Complete your shop with this modern metallizing installation



WIRE GUN—Sprays any metal that can be drawn into wire form.



POWDER GUN—Sprays hard-facing alloys and ceramics in powder form.

Without metallizing, no maintenance or "job" shop can offer the same complete service as the shop that uses industry's low-cost "putting-on" tool.

With modern, low-cost metallizing equipment you can spray carbon steels, stainless, babbitts, brass, bronze, nickel, aluminum, tin, zinc, special hard-facing alloys, including tungsten carbide.

■ Save up to 90% of replacement costs on machine repair jobs ■ Do your own hard-facing at high speed, low cost ■ Apply long-wearing, corrosion-resistant coatings

A real opportunity for the smaller shop. Thousands of large, well-known companies and shops have been metallizing users for many years, not only in maintenance work but in production applications on original equipment. Now, with modern low-cost metallizing equipment this high-speed "putting-on" tool is within the reach of even the smallest shop.

FREE BULLETIN



Send off the coupon for detailed information—find out how a metallizing installation can pay for itself in a very short time. No obligation, of course.

METALLIZING ENGINEERING CO., INC.



METALLIZING ENGINEERING CO. INC.

1177 Prospect Ave., Westbury, L. I., New York

Please send me free bulletin on metallizing.

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STAMP**

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Hoggson stamps are made of finest alloy steel, heat treated to stand continuous impact without breakage of face or mushrooming of body. Available for marking letters, figures or symbols on almost any metal, plastic, or wooden product. Any style letter or figure in face sizes from $\frac{1}{32}$ " to $\frac{1}{2}$ ".

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**HOGGSON & PETTIS MFG. CO.,
New Haven 7, Conn.**

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162 MODERN MACHINE SHOP

more production . . .

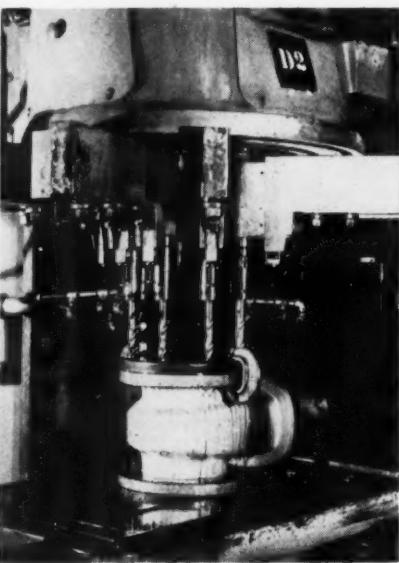
The only setup needed with the machine is to adjust the length gauge for length of rod desired. In addition, cuts are smooth so that rods can be threaded immediately without deburring.

For more data circle 7 on Postpaid Card

★ modern machine shop ★

Simple Tooling Eases Valve Production

The glamour of super precision obscures the fact that a large part of metalworking's work is still done to garden variety tolerances. At Alloy Steel Products Company, Linden, New Jersey, a simple bushing plate,



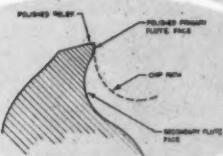
Simple tooling setup used at Alloy Steel Products Company for drilling valve flanges.

WELDON

Ski-Kut END MILLS

FOR CUTTING ALUMINUM

PATENT APPLIED FOR



CUTTING ALUMINUM MADE EASIER, SMOOTHER AND FASTER

The primary flute face of the Ski-Kut End Mills, being narrow, definitely minimizes adherence of chips to the flute faces. Such adherence or welding of aluminum chips contributes in a major degree to the difficulty in milling aluminum.

Greater feeds, longer tool life, better finish, easier operation of equipment are some of the advantages to be gained by the use of Weldon Ski-Kut End Mills for cutting aluminum.

Weldon SKI-KUT End Mills are available from stock in size from 1/4" to 2" in various lengths. For full information write for folder SKM-1

A RADICALLY NEW DEVELOPMENT
IN END MILL DESIGN FOR CUTTING
ALUMINUM THAT SPEEDS PRODUCTION
AND REDUCES COST.

Catalog list numbers are now marked on all Weldon tools and holders as an aid when reordering . . . another WELDON FIRST.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.



1. Minimizes adherence of Chips to Flute Faces
2. Increased Shearing Action(45° Helix Angle)
3. Hammering Effect Practically Eliminated
4. Greater Feeds
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6. Better Finish
7. Easier Operation

OVER
40 YEARS
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THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

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more production . . .

C-clamped to the workpiece, is all the fixture required for drilling the hole pattern in the flanges of stainless steel industrial valves. The rest of the "fixture" — location of the drills, alignment of the working surface, and gripping of the part—is provided by the machine itself, a Natco C3B. This multiple-spindle drilling machine holds the workpiece steady by constant hydraulic pressure exerted on the drills. Such steady pressure keeps the drills cutting and prevents work hardening in corrosion-resistant alloy castings. It also prevents drill breakage by easing the drills through the breakthrough point.

Aloyco now has five multiple-spindle Natcos working on jobs like these. The company manufactures a variety of stainless steel industrial valves for the chemical, petrochemical, synthetic fiber, missile and atomic power industries.

For more data circle 8 on Postpaid Card

★ MODERN MACHINE SHOP ★

Machine Checks Presence of Hole and Slot in Automotive Stud

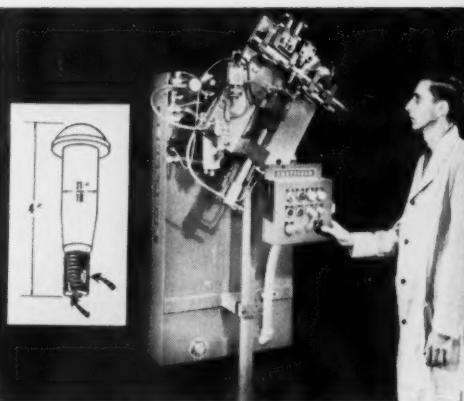
Shown herewith is an automatic inspection and segregating machine that checks the presence of a cotterpin hole and a screwdriver slot in a plain or threaded stud, at the rate of 2500 pieces per hour, ejecting those without holes and slots immediately after inspection. A typical part piece is shown in the sketch. It is a stud, front sus-

pension—upper arm ball joint and lower arm ball joint.

The Instruments and Systems Division of The Sheffield Corporation, Dayton 1, Ohio, a subsidiary of Bendix Aviation Corporation, designed and built the machine for a major automobile manufacturer. Four different size studs are checked on the machine through the use of interchangeable tooling.

Studs are gravity fed into the machine along slide rails, entering the checking station singly, slot end down. The bottom half of the stud seats into a receiver ring where controlled airflow detects the presence or absence of the hole, and a Sheffield Airlectric control unit converts the pneumatic impulse into electrical signals to actuate a stamping device if the part is O.K., or to reject an unacceptable one. Screwdriver slot presence is accurately checked with the aid of a probe operating against a microswitch.

For more data circle 9 on Postpaid Card



Machine used by major automobile manufacturer to automatically check presence of cotterpin hole and screwdriver slot in stud.

compare

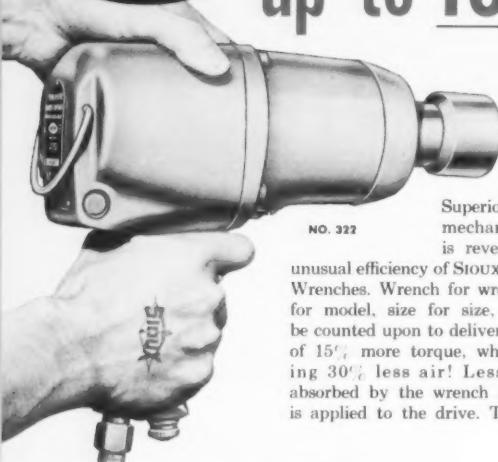
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SIOUX

AIR or ELECTRIC
IMPACT WRENCH



NO. 322

No guess work with



When it's a Sioux, you know what it will do! Sioux tells you the torque your air or electric impact wrench will deliver. You don't buy just a wrench. You buy certified Sioux power, reversible power, and on air wrenches controllable power through eight point power selector.

A SIZE FOR
EVERY NEED!

From the big No. 322 Sioux Air Impact Wrench (upper left) capable of up to 1,000 foot pounds of torque at 90 pounds of air pressure, to the little No. 313 (pictured at right) which weighs $2\frac{1}{2}$ pounds and can deliver up to 80 foot pounds of torque, there's a full range of Sioux impact wrench sizes and models.

SIOUX
Electric
IMPACT
WRENCHES



Air impact wrenches deliver up to 15% more torque

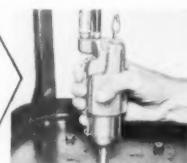
while consuming
30% less air!

Superiority of their mechanical design is revealed in the unusual efficiency of Sioux Air Impact Wrenches. Wrench for wrench, model for model, size for size, SIOUX can be counted upon to deliver an average of 15% more torque, while consuming 30% less air! Less power is absorbed by the wrench itself. More is applied to the drive. Three Sioux

wrenches can be operated on the existing air supply for every two of another kind. This correctness of engineering design has also produced a wrench of superior endurance, longevity, and freedom from trouble. Low first cost, higher torque, lower air consumption and long trouble-free life add up to make SIOUX THE BIG BUY IN AIR IMPACT WRENCHES!

REACTION BALANCED for Less Vibration Feed Back

All Sioux Impact Wrenches are "reaction balanced" for less vibration and torque feedback and for minimum operator fatigue. There's less shock and twist when the wrench impacts. You can feel the difference!



SIOUX Electric Impact Wrenches offer equal power in right or left hand rotation. The torque for each wrench is stated and certified. Their mechanical design offers exactly the same advantages as that of the air wrenches. Their exclusive reverse cap switch lock prevents reversing with the current on, and eliminates burning commutator brushes and switch contacts. Their efficiency, performance, and freedom from trouble are unexcelled.

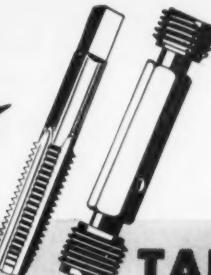
Look under "TOOLS, ELECTRIC" in the Yellow Pages

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CUTTING TOOLS

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SPECIAL RIGHT HAND & LEFT HAND TAPS* HIGH SPEED STEEL

SIZE	THREADS PER INCH	SIZE	THREADS PER INCH	SIZE	THREADS PER INCH
00	90-96	11/32	20-28-32-40-48	1 1/16	6-8-10-12-14-16-18-20-24-
0	70-72-76-80-96-100	1/4	12-13-14-18-20-22-27-28-30-	27-32	
1	48-56-60-64-72-80-96-100	5/16	32-36-40-48	1 1/8	6-8-10-12-14-16-18-20-24-
2	48-52-54-56-64-72-80	13/32	16-20-24-32	27-32	
3	40-44-46-48-56-64	7/16	12-14-16-18-20-24-27-28-32-	1 1/16	8-10-12-14-16-18-20-24
4	32-36-40-44-48-56-60-64-	15/32	36-40-48	1 1/2	6-8-10-12-14-16-18-20-24
	72-80	32		1 1/8	12-14-16-18-20-24
5	30-32-36-40-44-48-56-60-64-	17/32	12-13-14-16-18-20-24-27-28-	1 1/4	5 1/2-6-8-10-12-14-16-18-20-
	80-100	36-40	32-36-40	24	
6	28-30-32-36-40-44-48-56-60-	19/32	12-14-16-18-20-24-27-28-32-	1 11/16	6-8-10-12-14-16-18-20-24
	64-72-80	36-40	36-40	1 1/2	5-8-10-12-14-16-18-20-24
7	30-32-36-40-48-64	1 1/8	10-11-12-14-16-18-20-24-27-	1 13/16	8-10-12-14-16-18-20-24-32
8	24-28-30-35-38-40-44-48-56-	11/16	28-32-36-40	1 1/4	5-8-10-12-14-16-18-20-24
	60-64-80	32-36-40	10-11-12-14-16-18-20-24-27-	1 1/16	5-6-8-10-12-14-16-18-20
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12	20-22-24-28-30-32-36-40-48-	1 1/8	28-30-36-40	2 1/4	8-10-12-14-16-18-20
	56-60	1 1/16	10-12-14-16-18-20-24-27-32	2 1/2	10-12-14-16
14	20-24-28-32-36-40-48	1 1/4	28-32-40	2 1/8	4-8-10-12-14-16-18
1/16	60-64-72	1 1/2	9-10-12-14-16-18-20-24-27-	2 1/4	12-14-16-18
1/8	32-36-40-44-48-56-64	1 1/8	27-32-40	2 1/2	8-10-12-14-16-18
1/4	72	1	8-9-10-12-14-16-18-20-24-	2 1/2	4-8-10-12-14-16-18
5/32	32-36-40-44-48-56	1 1/16	27-32-40	2 1/2	12-14
1/16	20-24-27-28-32-36-40-48-56	1 1/8	8-10-12-14-16-18-20-24-27-	2 1/2	8-10-12-14-16-18
7/32	20-24-28-32-36-40	1 1/4	32-36-40	2 1/4	4-6-8-10-12-14-16-18
3/8	36-48	1 1/2	7-8-10-12-14-16-18-20-24-	2 1/2	8-10-12-14-16-18
1/4	14-16-18-22-24-26-27-28-30-	1 1/8	27-32-36	2 1/2	4-6-8-10-12-14-16-18
	32-36-40-48-56-64-80	1 1/4	8-10-12-14-16-18-20-24-27-	3	8-10-12-14-16-18
5/32	18-20-24-27-28-32-40-64	32	32	3 1/4	8-10-12-14-16
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	32-36-40-48-64	27-32	27-32		

6° EXTENSION TAPS

HIGH SPEED STEEL PLUG OR SPIRAL POINT

Size & Thds.	Size & Thds.
6-32	1/4-28
8-32	5/16-24
10-24	5/8-24
10-32	5/16-20
	1/2-20

OVER & UNDERSIZE

+.005 -.005

Size & Thds.	Over & Undersize
1/4-20	+.005, +.010, -.0015
5/16-18	+.005, +.010, -.0015
5/16-16	+.005, +.010, -.0015
5/16-13	+.005, +.010, -.0015

UNIPASS ACME TAPS

HIGH SPEED STEEL

Size & Thds.	Size & Thds.
5/16-10	1 1/4-5
5/8-8	1 1/4-5
5/8-6	1 1/4-4
5/8-5	1 1/2-4
1-5	

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Special Thread plug gages are in stock for immediate delivery of most sizes listed above.

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CHROME PLATED TAPS
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24 HOUR DELIVERY

Special taps from standard blanks not in stock are shipped from the factory in 24 hours or less.

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Why have your customers
wait for delivery of special
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Ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

Cleaning Tool for Threaded Lathe Chucks

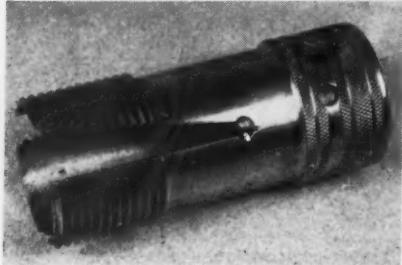
By H. J. GERBER

Many small engine lathes are equipped with threaded spindle noses. In order to install chucks and faceplates on these spindles so that they will run true, it is necessary that the threads, on both the spindle and in the chuck back plate, be absolutely clean. Brushing out these internal threads is often not adequate as chips may have become imbedded and will not easily be dislodged.

To solve this problem we have designed and made a number of the soft "spring taps" illustrated here-

with which have proved very satisfactory. This cleaning tool is made from a piece of soft steel seamless tubing upon which a thread, of the same size and pitch as the lathe spindle nose, is chased. The tube is then gashed out on two opposite sides to form a cleaning edge similar to the teeth on a tap. The opposite end of the shank is knurled to provide a hand grip.

The gashed end of the tool may be slightly spread apart to insure a tight fit into the chuck back plate. It is important that this tool not be hardened as it is not intended to be a cutting tool but simply a scraper which will dislodge and remove imbedded material from chuck threads.

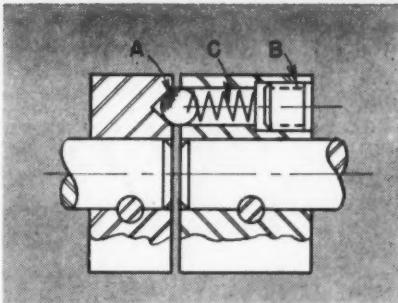


Cleaning tool for threaded lathe chucks. View showing how cleaning tool is used.

Simple Spring-Loaded Arrangement Replaces Shear Pins

By F. MURRAY

Replacing shear pins can be a bothersome job. A simple spring-loaded arrangement, such as the one illustrated in the accompanying sketch, can, in many cases, eliminate the need for shear pins. The seat for the ball, A, is made with a 90-degree countersink. A socket headless set screw, B, is used to adjust the pressure of the spring, C. Standard die springs can generally be used to provide the necessary spring pressure; the only alteration required is to cut the spring to the required length. As only one ball is used, the



Sketch showing simple spring-loaded arrangement for eliminating the use of shear pins.

timing of the shafts will not be disturbed in any way.

When using this particular arrangement, the shafts should be equipped with thrust bearings to take the thrust imposed by the spring.

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Specify BAY, the finest value in steel equipment, and be sure of receiving products which are designed properly—produced properly—unconditionally guaranteed. And you will receive them quickly!

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THE REASON: Our equipment is its own best salesman.

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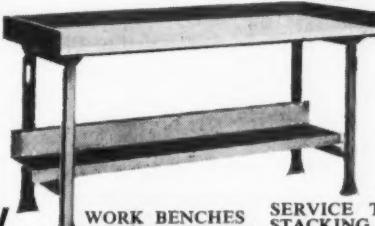
AMERICAN METAL WORKS, INC.
BALDWIN 9-1805
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Rapid cutting capacity.



Tapers per inch .005, —.008,—.013 in stock.



Large range of standard sizes in stock at all times for your convenience.

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COMPLETE INFORMATION

GAMMONS • HOAGLUND CO.

MANCHESTER 2, CONN.
Manufacturers of helical taper pilot chucking,
die makers and special reamers.

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168 MODERN MACHINE SHOP

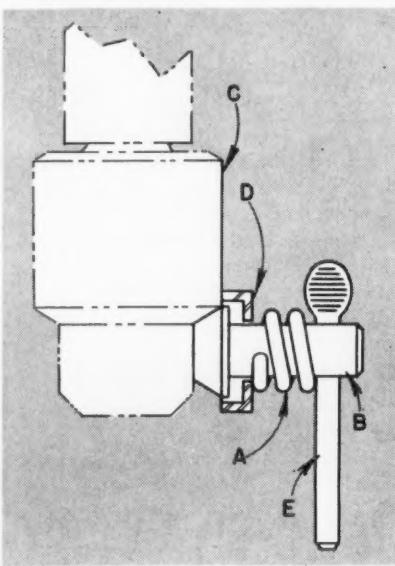
ideas from readers . . .

Drill Chuck Safety Key

By HAROLD SEDLIK

The drill chuck key shown in the accompanying sketch has two safety features: (1) The spring, A, drill prevent the key, B, from remaining in the gear type drill chuck, C, when not in use, thus avoiding a possible accident should the machine be turned on. (2) The cap, D, will protect the operator from pinching a finger between the gear teeth of the key and chuck.

The cap, D, is bored to fit over the body and gear of the key as shown. To install the cap and spring, the T-handle, E, is first pressed out, the cap and spring are assembled, and the T-handle is then replaced.



Sketch showing safety key for drill chuck.

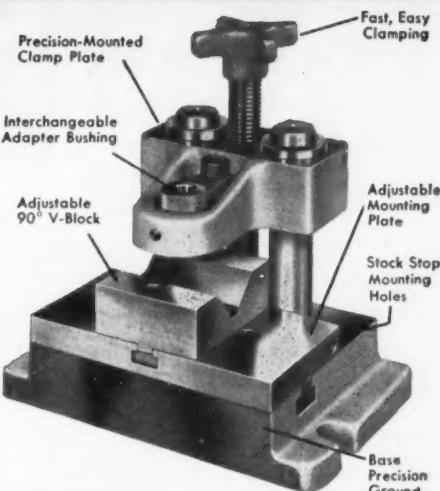
February, 1960

REPCO Time-Saving Tools

ADJUSTABLE V-BLOCK DRILL JIG

Saves Set-Up Time—
Increases Output

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to $\frac{1}{2}$ " diameter. Handles stock from $\frac{1}{4}$ " to 2" diameter.

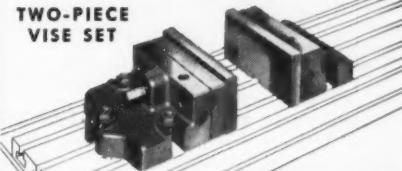


TRUE-CENTER ADJUSTABLE TOOL HOLDER



The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as $\frac{1}{2}$ " machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET



Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

CHUCK JAW TRUING-RING SET



This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by $\frac{1}{8}$ " increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET

Heavy-duty live center plus six interchangeable adapters, ranging from a point to $\frac{1}{2}$ " dia. ball. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.



Write for complete information—Exclusive agent territories open.

ROCKFORD ENGINEERED PRODUCTS CO.

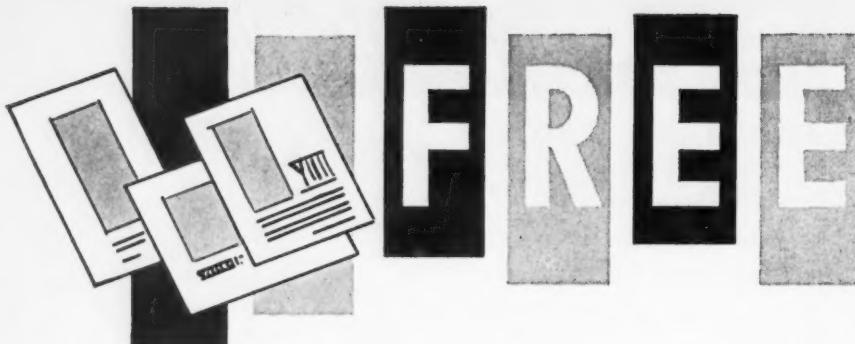
23rd Ave. & 20th St., Rockford, Illinois

For more data circle 426 on Postpaid Card



February, 1960

MODERN MACHINE SHOP 169



Use Postpaid Cards opposite Page 32 and Inside Back Cover for requesting free copies of literature listed below.

Grinding Wheels

American Emery Wheel Works, Red Bridge, Providence 1, R. I. Instructive four page brochure describes in detail the new Duraflex Dished-Depressed Center Grinding Wheel. Intended and written as an aid to those with grinding wheel problems, this brochure is an informative, illustrated work that contains all design characteristics and safety features of this new wheel.

For more data circle 10 on Postpaid Card

Milling Cutters

Aber Engineering Works, Inc., Waterford, Wis. Bulletin 52-59 contains 16 pages of technical data on milling cutters. It features descriptions, illustrations, sizes and prices of various cutters. The descriptive matter offers helpful hints on time and money saving production problems.

For more data circle 11 on Postpaid Card

Wet Abrasive Cutting Machine

American Chain and Cable Co., Inc., Allison-Campbell Division, 951 Connecticut Ave., Bridgeport 2, Conn. An information-packed, four page folder—Bulletin DH-260-R—describes the efficient, dependable and heavy duty Campbell 406 Wet Abrasive Cutamatic. The unit is an oscillating wheel type of wet abrasive cutting machine with hydraulically operated work clamps and wheel feed.

For more data circle 12 on Postpaid Card

C Clamps

Automatic Tool Products Co., 676 Pennsylvania Ave., Elizabeth, N. J. Bulletin on a fast action, aluminum alloy, C clamp, which combines light weight with durability.

For more data circle 13 on Postpaid Card

Tapping Head

Armitie Laboratories, 6609 Broad St., Los Angeles 1, Calif. Bulletin describes and illustrates the Tap-Tool, which is a super sensitive tapping head, that has been designed expressly for sensitive, high speed tapping of 0-80 to 4-40 holes in steel.

For more data circle 14 on Postpaid Card

Marking Equipment

The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Bulletin No. 114 shows various models of The Acromarker, which is a nameplate and parts marking machine that marks clearly and deeply. This machine is available in several sizes and styles.

For more data circle 15 on Postpaid Card

Drill Jig Bushings

American Drill Bushing Co., 5107 Pacific Boulevard, Los Angeles 58, Calif. This brochure contains information on sizes, prices and quantity discount for the company's Thinwall Drill Jig Bushings.

For more data circle 16 on Postpaid Card

LITERATURE

Resistance Welding

Sciaky Brothers, Inc., Department L-27, 4915 West 67th St., Chicago, Ill. Volume 5, No. 6, entitled "Resistance Welding at Work," is a 16 page bulletin that fully describes a variety of resistance welding case histories.

For more data circle 17 on Postpaid Card

Shear Knives

American Shear Knife Co., Homestead, Pa. Illustrated brochure describes the company's full line of shear knives for all metal cutting applications. Descriptive sections are featured on each of six grades of A.S.K. shear knives, together with the company's recommendations for their specific use. Also shown are rotary slitter knives, spacing collars, wearing plates, tinning machine and galvanizing rolls, punches and dies.

For more data circle 18 on Postpaid Card

Four Slide Machine

Torrington Manufacturing Co., Torrington, Conn. Detailed operating features and specifications for the new V-81 Verti-Slide four slide machine are given in this six page technical bulletin. Machine components, which are described fully, include the unique cam timing disc, center form, slide feed assembly, toggle type press and forming slides.

For more data circle 19 on Postpaid Card

Inspection Equipment

J. C. Busch Co., 126 East Pittsburgh Ave., Milwaukee 4, Wis. Catalog No. 124 gives complete data on the Milwaukee line of precision inspection equipment. Profusely illustrated, the new bulletin covers full description and specs of all types of surface plates, angle plates, box parallels, squares and straightedges.

For more data circle 20 on Postpaid Card

Electric Furnace

Thermo Electric Manufacturing Co., 488 Huff St., Dubuque, Iowa. Bulletin No. F-212 concerns the Thermolyne Electric Furnace, Type 2100, which is a dependable and economical multi-purpose electric furnace.

For more data circle 21 on Postpaid Card

Hand Knurler

Rockwin Manufacturing Co., 80D Magnolia Ave., Westbury, Long Island, N. Y. Pamphlet describes the Knurlmaster Hand Knurling Tool, with a capacity of from $\frac{1}{8}$ to 1 inch.

For more data circle 22 on Postpaid Card

Ovens

Blue M Electric Co., Blue Island, Ill. Informative, four page, two color brochure on Ultra-temp Ovens. Units described include recirculating ovens, miniature batch ovens and mechanical convection ovens.

For more data circle 23 on Postpaid Card

Mechanical Tubing

Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Folder discusses two general purpose steels; No. 4340, a through hardening steel and No. 4620, a case hardening steel. Both are available in tube form in a complete range of sizes.

For more data circle 24 on Postpaid Card

Vibration Isolation Equipment

Barry Controls, Inc., 783 Pleasant St., Watertown 72, Mass. Bulletin 59-04.4 concerns Barry Isolators, Series 670 and 297. They are designed to isolate shock, vibration and noise caused by impact, rotating and reciprocating machines.

For more data circle 25 on Postpaid Card

free literature . . .

Toolroom Lathe

Rivett Lathe and Grinder, Inc., Department MMS-1, Brighton 35, Boston, Mass. 16 page catalog contains complete information on the 1020 Toolroom Precision Lathe.

For more data circle 26 on Postpaid Card

Coolant Cleaning Equipment

Barnes Drill Co., 860 Chestnut St., Rockford, Ill. Illustrated, eight page brochure

discusses the use of Barnesdril Kleenall fabric filters and combination magnetic and fabric filters. Bulletin No. 100 outlines production savings; the operation of the equipment is explained; applications are shown. These filters automatically remove sludge from coolant in grinders, gear shavers, automatic screw machines, broaching machines, super-finishing, millers and deep hole drills.

For more data circle 27 on Postpaid Card

Rotary Shelf Ovens

Despatch Oven Co., 619 Southeast Eighth St., Minneapolis, Minn. Bulletin on rotary shelf laboratory or production ovens, which feature forced convected horizontal air flow: gas, electric or steam.

For more data circle 28 on Postpaid Card

Aluminum Bars

Bunting Brass and Bronze Co., Toledo 1, Ohio. 12 page brochure is a combination of interesting data, tabular matter and basic technical facts. It is entitled "The Technology of Bunting Bearing Aluminum Bars."

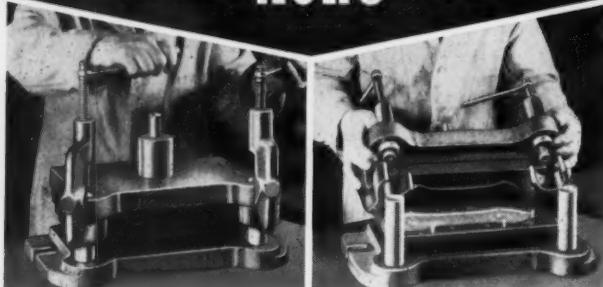
For more data circle 29 on Postpaid Card

Machinists' Vises

Columbian Vise and Manufacturing Co., 9023 Bessmer Ave., Cleveland 4, Ohio. L-1128A describes a new line of machinists' vises. Contents include complete specifications of 3, 3½, 4, 4½, 5, 6 and 8 inch swivel base and stationary base vises. The latter can be converted to 360 degree swivel type by the addition of a swivel kit.

For more data circle 30 on Postpaid Card

FOR EASY, FAST UNIFORM SEPARATION OF DIE SETS... USE THESE ACRO PULLERS



Separate die sets with even upward pull. Die sets separate evenly and safely.

When you have die set pullers that remove the punch holder from the die shoe by a straight upward pull and the punch holder slides upward from the die shoe simultaneously and safely from both leader pins, you have Acro Die Set Pullers and you're saving time.

If you're not, this is how it's done with Acro Pullers: Indexed screw wrenches act as indicators, controlling the upward travel. This is an exclusive patented Acro feature and found only in ACRO DIE SET PULLERS. It may pay you to investigate. Write for further free information today.

OTHER ACRO TIME SAVERS FOR YOUR SHOP
include Acroflex, drill rod racks, leader pin oilers and wing nuts. Write for complete descriptive folder. Ask for bulletin TP59.



ACRO METAL STAMPING COMPANY

330C E. Reservoir Ave., Milwaukee, Wis.

For more data circle 427 on Postpaid Card

Heat Treating Furnaces

Electra Products Co., Montgomeryville, Pa. Flyer on Series 2000 and 2300 general purpose, box type, electric furnaces for hardening, annealing, drawing, preheating and other applications requiring temperatures up to 2,000 and 2,300 degrees Fahrenheit.

For more data circle 31 on Postpaid Card

Coolant Pump

Wesco Tool, Inc., 2820 San Fernando Boulevard, Burbank, Calif. Bulletin on the Wesco Coolant Pump; new centrifugal type, motor driven. It is made of welded steel, with carrying handles. It is equipped with removable inner container, separates and retains chips for fast clean-out. Data is also given on the Wesco Pump System, for jobs which circulate coolant liquids containing grit and abrasives.

For more data circle 32 on Postpaid Card

Valves

Fulflo Specialties Co., Inc., 416 Fancy Ave., Blanchester, Ohio. New data book on Fulflo Valves for positive automatic pressure control. Included are flow charts for valves and pipes, dimensions, specifications and other data.

For more data circle 33 on Postpaid Card

Broaches

duMont Corp., Greenfield, Mass. Broach Catalog and Price List S describes square broaches, hexagon broaches, production type keyway and keyway broach kits.

For more data circle 34 on Postpaid Card

Lapping Machines

Crane Packing Co., 6418 Oakton St., Morton Grove, Ill. Bulletins describe the Lapmaster line and include a chart on measuring flatness.

For more data circle 35 on Postpaid Card

Conveyor Screens

Syntron Co., 309 Lexington Ave., Homer City, Pa. Catalog section on mechanical conveyor screens, designed for the scalping and coarse and medium sizing of a wide range of bulk materials.

For more data circle 36 on Postpaid Card



FOR APPROXIMATELY \$50 YOU GET 12 SETS, EACH SET GROUND READY TO GO

*Men would not accept
EITHER IDEA AT FIRST ...*

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For approximately \$50 you get a dozen sets of $\frac{3}{4}$ -16 insert chasers, each ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest"

**THE EASTERN MACHINE SCREW CORPORATION
40-50 Barclay Street, New Haven, Conn.**

For more data circle 428 on Postpaid Card

free literature . . .

Saw Grinder

W. Von Arnauld Co., 95 Grove St., Oakland, N. J. Four page color bulletin on the Tempo Type AS 6-10 Automatic Saw Blade Grinding Machines. These machines are designed for grinding of segmental circular saws and all types of metal cutting circular saw blades having either straight or curved tooth profiles, as well as for special profiles of rapid cutting off machines.

For more data circle 37 on Postpaid Card

Die Steel

Latrobe Steel Co., Latrobe, Pa. Olympic FM Data Sheet tells all about fully uniform, free machining, desegregated Olympic FM high alloy die steel.

For more data circle 38 on Postpaid Card

Special Fasteners

Standard Pressed Steel Co., Box 556, Jenkintown, Pa. A thumbnail review of its high precision machining facilities is offered in this folder. The brochure, for the Nuclear Components Division, takes readers on a two minute tour of SPS capabilities for turning out both small and large intricately machined special fastenings and related parts for nuclear reactors, conventional power equipment and other critical machinery.

For more data circle 39 on Postpaid Card

Grinding Fixture

Cavic Engineering Co., 1313 West Essex Ave., Kirkwood 22, Mo. Bulletin on a threading tool grinding fixture, with 60 and 7 degree relief angle incorporated into it.

For more data circle 40 on Postpaid Card

Drill Bushings

Universal Engineering Co., Frankenmuth 9, Mich. Complete catalog on Universal Drill Bushings, that are designed for speed and accuracy in production.

For more data circle 41 on Postpaid Card

Tracer Control

Systems

True-Trace Corp., Department P1, Post Office Box 3307, El Monte, Calif. Four page, two color Bulletin No. SB-2 describes and illustrates hydraulic tracer



*Six machines protected from dust
by Torit for \$666 15*

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just \$666.15!

After one year's operation, Mohr Lino Saw says this about their low-cost Torit installation: "The Torit installation has kept our shop cleaner, our operators happy, and protected vital machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust at its source with a completely self-contained and portable Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.

Dept. 703, 1133 Rankin Street, St. Paul 16, Minn.

For more data circle 429 on Postpaid Card



control systems for one, two and three dimensional applications on machine tools.

For more data circle 42 on Postpaid Card

Machine Shop Accessories

Brown and Sharpe Manufacturing Co., Providence 1, R. I. Catalog No. 27A lists arbors, adapters, collets and other machine shop accessories. Listings of these products have been improved in a manner which will make the catalog useful for distributors and users. Important features and characteristics shown are all listed compactly so that the materials, limits and other features can be absorbed at a glance.

For more data circle 43 on Postpaid Card

Bar Machines

Greenlee Brothers and Co., 1751 Mason Ave., Rockford, Ill. Catalog A-405 tells about versatile milling with Greenlee Automatics. Slots or flats on small diameter parts can be milled in one operation.

For more data circle 44 on Postpaid Card

Surface Grinder

Gallmeyer and Livingston Co., 408 Straight Ave., Southwest, Grand Rapids, Mich. Catalog on the No. 350 precision, tool room type, hydraulic feed, surface grinder.

For more data circle 45 on Postpaid Card

Hydraulic Shears

Verson Allsteel Press Co., 9300 South Kenwood Ave., Chicago 19, Ill. Eight page bulletin describes the Verson line of hydraulic shears. They range in ca-

pacity from 8 feet of $\frac{3}{8}$ inch mild steel to 12 feet of $1\frac{1}{2}$ inch mild steel. The bulletin shows typical models and presents specs for all models. Also included are descriptions and illustrations of features of design and construction.

For more data circle 46 on Postpaid Card

Hack Saw Blades

Armstrong-Blum Manufacturing Co., 5700 West Bloomingdale Ave., Chicago 39, Ill. Bulletin CT-175 has complete details on Marvel High Speed Edge Hack Saw Blades.

For more data circle 47 on Postpaid Card



PALMGREN

127
Vises, Rotary Tables, Milling Attachments can speed up production, solve difficult angle jobs.

Used In All Industries... Everywhere



No. 60B SWIVEL MACHINE VISE \$119.95 No. 246 ANGLE PLATE \$16.95 No. 14 DRILL PRESS VISE \$21.95

Get this FREE Catalog NOW on work holding tools, showing 68 models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories, with jaw sizes from $1\frac{1}{2}$ " to 8" showing details and prices.



TILTING, INDEXING
and ROTARY TABLE \$139.50

CHICAGO TOOL & ENGINEERING CO.
8399 South Chicago Ave., Chicago 17, Illinois

For more data circle 430 on Postpaid Card

free literature . . .

Automatic Profiler

Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. Circular No. 635 concerns the Magne-Trace Automatic Profiler. The Magne-Trace is an all new tracer controlled milling machine, specially designed and built from the base up for self-feeding 360 degree profile milling operations under tracer control.

For more data circle 48 on Postpaid Card

Magnetic Blocks

Glover Manufacturing Co., 423 Park Ave., Meadville, Pa. Flyer on pin type magnetic blocks for grinding angles rapidly and accurately.

For more data circle 49 on Postpaid Card

Die Filers

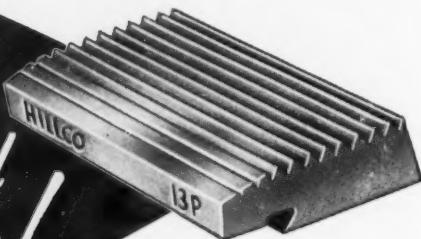
Rice Pump and Machine Co., 226 Park Ave., Beloit, Wis. Bulletin covers the FS series die filers, which are available in three models with speed variances of 2, 4 and variable speeds-variable strokes. Another bulletin concerns the Models PDF and PDM.

The company manufactures a complete line of bench and floor type die filers.

For more data circle 50 on Postpaid Card

"HILLCO" TANGENT CHASERS

We
think
you'll
agree!



The new line of "HILLCO" Tangent Chasers, which can be re-ground for 80% of their original length, are guaranteed to be of highest grade tool steels ground to exacting tolerances. We feel that this complete line of chasers are the finest that we have produced in our 75 years of cutting tool manufacture. We think that you will agree with us.



THE HILL ACME COMPANY

ACME MACHINERY DIVISION

1203 West 65th Street • Cleveland 2, Ohio

For more data circle 431 on Postpaid Card

176 MODERN MACHINE SHOP

Clamps

Conforming Matrix Corp., 396 Toledo Factories Building, Toledo 2, Ohio. Brochure describes mechanical and air operating clamps for holding masks and parts and standard and special fixtures used to speed up production in color decoration of mass produced products.

For more data circle 51 on Postpaid Card

Carbide Tools

Allegheny Ludlum Steel Corp., Carmet Division, Detroit 20, Mich. Catalog C-16-B is a 32 page book that contains revised prices and complete specs on Carmet's full line of cemented carbide tipped tools, blanks and holders. Speed and feed charts, grade comparisons and ordering information are included.

For more data circle 52 on Postpaid Card

February, 1960

Microhardness Tester

Torsion Balance Co., Clifton, N. J. Bulletin K-59 describes the Kentron Microhardness Testers. These instruments apply dead weight loads from 1 to 1,000 grams. Photographs and detailed descriptions of ten basic accessories are included.

For more data circle 53 on Postpaid Card

Size Finder

Landis Tool Co., Waynesboro, Pa. Four page color bulletin on the new Landis Size Finder with Microfeed that is designed for fast, accurate grinding of multiple diameter work. The Size Finder is available on new Landis plain grinders for grinding small to medium lots of multiple diameter shafts in plants that manufacture special machinery, machine tools, pumps and compressors, electric motors and numerous other types of machinery.

For more data circle 54 on Postpaid Card

Retainers

Pivot Punch and Die Corp., North Tonawanda, N. Y. A new concept of retainers with punches that can be pushed by hand into the retainer and removed with a simple pulling wrench, while still in the press, is presented in this catalog, which features standard prices.

For more data circle 55 on Postpaid Card

Hydraulic Presses

Rodgers Hydraulic, Inc., 7447 Walker St., Minneapolis 26, Minn. Catalog 337

has complete specifications, tables and data, making it an easy matter to select the press for the job.

For more data circle 56 on Postpaid Card

Thread and Form Grinders

Sheffield Corp., Department XX, Dayton 1, Ohio. Model Nos. 101 and 103 Precision Thread and Form Grinding Machines with typical Crushtrue threading applications are described in a new 12 page Catalog No. TFG-11-59.

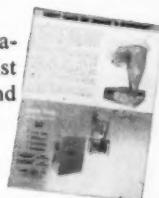
For more data circle 57 on Postpaid Card



Now, with more than fifty models in the Dustkop line—plus efficient accessory items—the odds are that a standard unit will solve your problem. Dustkop units solve other problems too. They're easier to install, save space and money and are virtually maintenance-free!

how to select a dust collector

This new brochure includes all basic information needed to select the right dust or mist collector for grinding, buffing, polishing and other types of service. Write for your copy. No obligation.



AGET Manufacturing Company
1398 Church St., Adrian, Michigan

For more data circle 432 on Postpaid Card

free literature . . .

Boring and Grinding Machines

Heald Machine Co., Worcester 6, Mass. 16 page, two color, illustrated condensed general catalog describes the basic design features of all Heald machines and covers the various models of Bore-Matics, internal grinders, rotary surface grinders, tool sharpeners, boring heads, wheelheads and attachments.

For more data circle 58 on Postpaid Card

Planishing Machine

Heidrich-Nourse Co., 631 East Third St., Los Angeles 13, Calif. Flyer on the Model 150-RHP-090 Pneumatic Planishing Machine for sheet metal working. This is a bench mounted machine. Complete specifications are given.

For more data circle 59 on Postpaid Card

Punch Presses

Kenco Manufacturing Co., 5211 Telegraph Road, Los Angeles 22, Calif. Four page bulletin illustrates and describes an extensive line of Kenco Punch Presses from 2 to 18 tons, including the Electro Safe Punch Presses, now offered in 5, 8, 12, 15 and 18 ton models. The bulletin shows deep throat, universal, slow speed, vari-speed and special Mark III and VII Presses, which are especially designed for multiple production operation.

For more data circle 60 on Postpaid Card



Complete recommendations for any job on request



Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

DREIS & KRUMP MANUFACTURING CO.

7418 South Loomis Boulevard, Chicago 36, Illinois

For more data circle 433 on Postpaid Card

Marking Devices

Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill. Pamphlet on interchangeable steel type and holders designed for metal, wood or plastic. A price list is included.

For more data circle 62 on Postpaid Card

Planer Milling Machine

Olivetti Corporation of America, Machine Tool Division, 42-33 Northern Boulevard, Long Island City 1, N. Y. This color brochure presents the Olivetti AF-30 Automatic Planer Milling Machine. A description of the machine is given, along with normal and extra equipment.

For more data circle 63 on Postpaid Card

Drilling and Tapping Units

Hypneumat, Inc., 647 West Virginia St., Milwaukee 4, Wis. Bulletin No. 5810 contains technical data on operation and selection of automatic drilling and tapping units, air or hydraulic powered. Booklet also features the various uses to which these units can be adapted.

For more data circle 64 on Postpaid Card

Cylinders

Hanna Engineering Works, 1741 Elston Ave., Chicago 22, Ill. Flyer on the new Hanna Powrimation Series 1000 Cylinders for air to 250 p.s.i.; hydraulic to 1,000 p.s.i.; bores 1½ through 14 inches. This line of cylinders features pressure safe tube seals, fast change cartridge gland, one piece steel heads, welded steel mountings and long lubricated bearing.

For more data circle 65 on Postpaid Card

Press Brakes

Niagara Machine and Tool Works, Buffalo 11, N. Y. The enlarged, modernized line of Series N Press Brakes, 90 through 1,500 tons, is presented in a new 28

page Bulletin 89E. Descriptions and illustrations of design features, special work area provisions, typical forming and bending dies, tables for computing bending, punching and blanking tonnages, die space, filler block dimensions and comprehensive specs are included.

For more data circle 66 on Postpaid Card

Checking Accessories

Sundstrand Corp., Sundstrand-American Broach Division, Ann Arbor, Mich. Bulletin A-561 gives data on accessories that save time and improve checking

Made in 3 grades:

"Peerless" (high carbon high chrome)

"Century" (high alloy)

"Standard" (low alloy)

Used by practically EVERY manufacturer of squaring shears as original equipment. Because they are ground to the closest tolerances in the knife industry — "CLEVELAND" shear blades insure maximum cutting life . . .

Manufactured and sold by:

THE HILL ACME COMPANY

CLEVELAND KNIFE DIVISION

1201 West 65th St. • Cleveland 2, Ohio

For more data circle 434 on Postpaid Card

free literature . . .

accuracy. Included among these are bench centers and balancing tools.
For more data circle 67 on Postpaid Card

Jig and Fixture Components

Northwestern Tools, Inc., 119 Hollier Ave., Dayton 3, Ohio. Conversion chart lists identical jig and fixture components manufactured by ten different companies. This chart was prepared to

aid purchasing men. It helps bulk their orders for component parts, rather than purchase small quantities from ten different companies.

For more data circle 68 on Postpaid Card

The advertisement features a large black and white photograph of a Johnson Model J band saw. The saw is shown from a slightly elevated angle, highlighting its rugged construction and the band saw blade. The brand name "JOHNSON" is printed twice on the machine: once above the headstock and once on the base. To the right of the saw, the word "THE SAW" is written in large, bold, sans-serif capital letters. Below the saw, a circular badge contains the text "JOHNSON MODEL 'J'". At the bottom left, another circular badge contains the slogan "that costs you NOTHING!" in a stylized font. The overall design is industrial and emphasizes the product's durability and cost-effectiveness.

**Johnson Model J
(Wet or Dry)**
Cuts anything in your stock pile.
10" rounds, 18" flats, structurals or odd shapes.
Centralized controls, special safety features, variable speeds.

True, you pay the low initial purchase price, but the big, rugged Johnson Model J is so well engineered, so dependable, so troublefree—so versatile, fast and accurate, that it quickly pays for itself in tangible savings. One Johnson metal cutting band saw...or a battery of them, will pay you big dividends in time, labor—smooth production and eliminate scrap.

Write Today . . . for your copy of the new Johnson catalog. All models and accessories described, illustrated in full.

Johnson MANUFACTURING CORPORATION
1011 Barnes Street Albion, Michigan
For more data circle 435 on Postpaid Card

Punching and Notching Units

Punch Products Corp., 3800 Highland Ave., Niagara Falls, N. Y. Catalog B illustrates and describes Unipunch Series B Hole Punching and Notching Units. Catalog provides fully dimensional drawings of the seven standard units for punching round and shaped holes up to 3.500 inch in diameter in up to $\frac{1}{4}$ inch thick mild steel.

For more data circle 69 on Postpaid Card

Pipe Fittings

Flick-Reedy Corp., Tru-Seal Division, 7N023 York Road, Bensenville, Ill. "Case Histories, Sheet No. 2" provides five illustrated case histories of the use of Tru-Seal Fittings to solve piping problems in industry. These are actual field applications, covering the use of Tru-Seal Fittings to eliminate leakage, positioning and overtightening damage on piping connections to diesel engines, diaphragm compressors, automatic door operating mechanisms, boring machines and, also, multiple unit gage card assemblies.

For more data circle 70 on Postpaid Card

Metal-Etch Resist

Eastman Kodak Co., Graphic Reproduction Sales Division, Rochester 4, N. Y. 16 page pamphlet describes the general procedure in the use of Kodak

Metal-Etch Resist and outlines several of its early applications in industry. A bibliography to current literature on photo milling is included.

For more data circle 71 on Postpaid Card

Machine Tool Replacement Formula

Jones and Lamson Machine Co., 521 Clinton St., Springfield, Vt. Booklet announces the new and improved Machine Tool (or other capital equipment) Replacement Formula. The formula in itself is a simple, two page form which, when properly completed, presents a graphic picture of the costs involved in operating old, obsolete equipment, as compared with new, efficient equipment. A four page folder is included with instructions for completing the machine tool replacement analysis and a work sheet.

For more data circle 72 on Postpaid Card

Band Saws

Peerless Machine Co., Racine, Wis. Bulletin 6601 presents the Peerless High Speed Metal Band Saws. Three models are described: Model 2216 which has a four speed belt pulley drive, Model 1216 with greater capacity and variable speed drive and the fully automatic Model 1214 that is equipped with automatic feed conveyor.

For more data circle 73 on Postpaid Card

Plastic Steel

Devcon Corp., Danvers, Mass. Industrial Application Bulletin No. 2 is an illustrated eight page brochure on plastic steel and other Devcon products. It describes how

several manufacturers have saved time and reduced costs in their tooling programs by using Devcon materials.

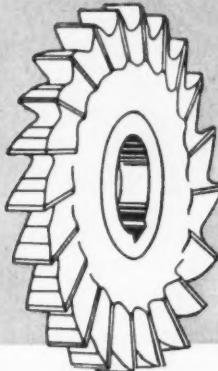
For more data circle 74 on Postpaid Card

Saw Blades

Circular Tool Co., Inc., Providence 5, R. I. Catalog O contains information on more than 1,200 catalog items, including solid carbide slotting saws, combination center drills, slitting discs, carbide tipped saws, screw slotting saws and deep cutting saws.

For more data circle 75 on Postpaid Card

Better Tools From SENTRY Hardening



THE TRUE TEST of your machine tools is their performance on the job — how they benefit your production. This is where Sentry Furnaces with the Diamond Block method of atmosphere control demonstrate their value. Your high speed steel tools hardened in the truly neutral Sentry Diamond Block atmosphere achieve maximum hardness without scale or decarburization, maintain their sharp cutting edges longer, step up production.

Write for literature and send sample of your tools for free demonstration hardening.

505-9

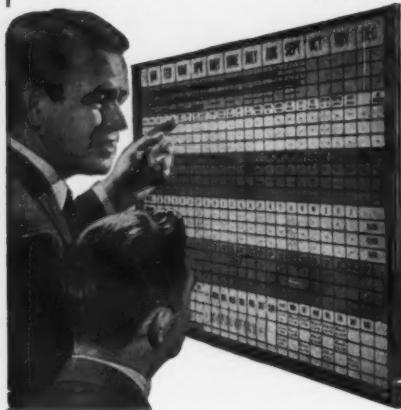
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182 MODERN MACHINE SHOP

free literature . . .

Four Slide Equipment

A. H. Nilson Machine Co., 627 Bridgeport Ave., Shelton, Conn. Nilson General Catalog on automatic four slide equipment. Nilson Automatic Four Slides are universal forming machines, designed to produce either wire forms or metal stampings at high production rates.
For more data circle 76 on Postpaid Card

Heat Treating Equipment

Ipsen Industries, Inc., 715 South Main St., Rockford, Ill. "A Study of Temperature Uniformity in Heat Treating" is the subject of this eight page reprint. Temperature uniformity and furnace design are discussed. Graphs show test results under three conditions: with no baffle and no fan, without a baffle and with a fan, with a baffle and fan.
For more data circle 77 on Postpaid Card

Multi-Flo-Reforming Process

Lodge and Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio. New four page color brochure gives detailed information on the Multi-Flo-Reforming Process; from flat blank to 14 inch deep shell in just three forming operations. The No. 12 Vertical Floturn Machine and the new Multi-Flo-Reform Process are said to save tooling, equipment, labor, materials, rejects, floor space, maintenance and material handling.
For more data circle 78 on Postpaid Card

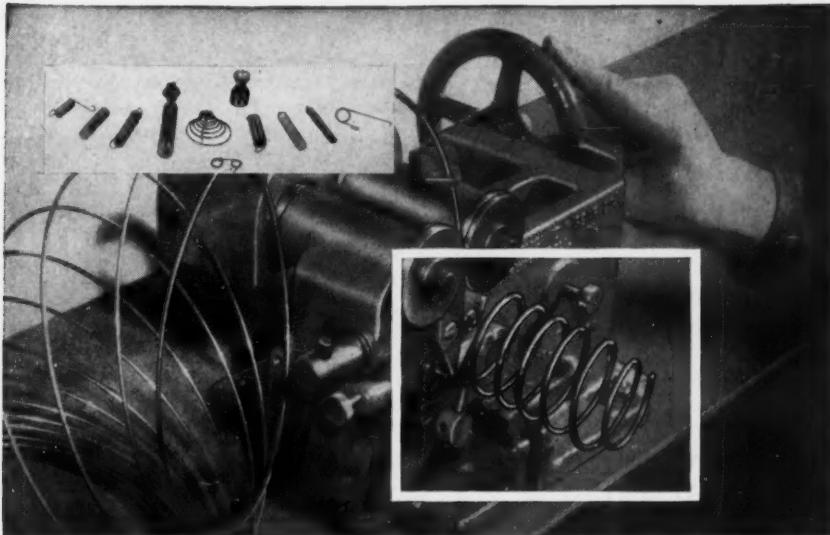
Arc Welding Electrodes

Air Reduction Co., Inc., Air Reduction Sales Co. Division, 150 East 42nd St., New York 17, N. Y. Form ADC 650 is entitled "Electrode Pocket Guide." The 64 page booklet contains complete information on all types of electrodes available from Airco: mild steel, low alloy, low hydrogen, iron powder, stainless steel, hardfacing, non-ferrous and cast iron.
For more data circle 79 on Postpaid Card

Cavity Sinker

Anocut Engineering Co., 631 West Washington Boulevard, Chicago 6, Ill. Six page color Bulletin No. 200 on the Anocut Electrolytic Horizontal Cavity Sinker, the HCS-59. This brochure describes the machine, its applications and limitations.
For more data circle 80 on Postpaid Card

February, 1960



Make any type spring . . . fast, exact! WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32" to 12" and larger, with or without initial tension, and with

open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!



Starrett adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

For more data circle 438 on Postpaid Card



MACHINE AND GEAR CO.

Special Machinery Division,
West Springfield, Mass.

Perkins Machine and Gear Co.
Special Machinery Division, Dept. D1
W. Springfield, Mass.
Please send information and prices on
Perkins Spring Coiler.
Hand Model Power Model

Name..... Title.....

Company.....

Address.....

City..... State.....

NEWS

of the industry

**New companies . . . officers . . . retirements
... company acquisitions . . . new trademarks**

Edited by L. L. BALDHOFF

EXECUTIVE POSITION CHANGES AT DeVlieg

Several executive position changes have been announced by DeVlieg Machine Company, located in Royal Oak, Michigan.

C. B. DeVlieg has been named chairman of the board of directors. He previously served as president.

C. R. DeVlieg, who was formerly executive vice president, has been named president.

Richard A. Jerue, who was chief engineer, is now vice president in charge of engineering for the company, and Allen N. Sweeney, who was formerly chief engineer of the Micro-bore Division, has been named director of engineering and research.

Mr. DeVlieg stated that these position changes were brought about to meet the needs of expanding activity of the company.

★ modern machine shop ★

JOINT MANUFACTURING COMPANY IS FORMED

John Lang and Sons, Limited, machine tool makers of Johnstone, Renfrewshire, Scotland, and the Gisholt Machine Co., Madison, Wis., have announced the formation of a joint manufacturing Company—Lang Gisholt Machine Company, Limited.

This company will occupy the existing John Lang and Sons, Limited factory at Johnstone near Glasgow, the manufacturing capacity of which will progressively be expanded.

Directors of the new joint company are: George H. Johnson, chairman; J. T. Lang, managing director; Lt. Commander J. H. M. G. Lang; J. S. Lang; H. S. Johnson II; and Carl W. Hayden.

Lang Gisholt Machine Company, Limited will manufacture the complete Lang range of lathes and power operated chucks for John Lang and Sons, Limited. They will also continue the



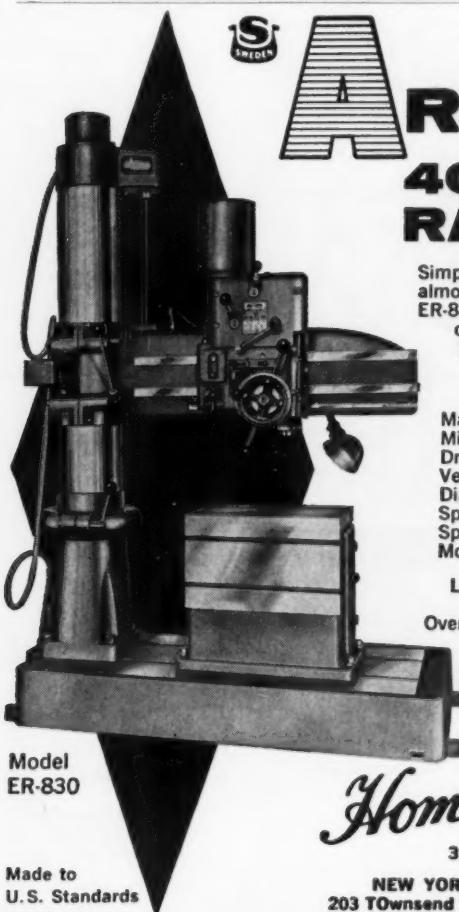
(Left) C. B. DeVlieg and (Right) C. R. DeVlieg

present Lang gear cutting for the trade. Manufacture of the Gisholt range of machine tools will be introduced on a steadily expanding basis for Gisholt (Great Britain) Limited.

The companies involved have agreed to a full scale interchange of information and manufacturing technique between the United States and Scotland to provide this joint company with the greatest possible access to modern production techniques.

ROCKFORD MACHINE TOOL ELECTS NEW EXECUTIVE OFFICERS

Rockford Machine Tool Co., Rockford, Ill., recently announced the election of the following new executive officers: Harry B. Newton, chairman of the board; Kenneth M. Allen, president; Robert C. Christenson, vice president and secretary; and Howard H. Swenson is assistant secretary.



ARBOGA 40" All-Gearied RADIAL DRILL

Simplicity in design, low price and suitability for almost all drilling operations make the ARBOGA ER-830 a really outstanding tool. This 40" radial drill has a large working area. The radial arm has power elevation. Roller bearing column, coolant system and the exclusive Drill Ejector are standard.

Max. distance spindle to column:	40"
Min. distance spindle to column:	13 1/4"
Drilling capacity in steel:	1 1/2"
Vertical travel of arm:	26"
Diameter of column:	8 5/8"
Spindle travel:	6 5/8"
Spindle taper:	#4
Motor size, H.P.:	2.2/1.5

Let any one of over 100 dealers demonstrate for you this and other ARBOGA machines. Over 100,000 are in use now, many completing 25 years of trouble-free service. Call any one of the numbers below or ask us for the name of your ARBOGA dealer. Illustrated brochure on request.

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Angeles 3-7479

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news of the industry . . .

**GIDDINGS AND LEWIS
ANNOUNCES TRADEMARK FOR
PRODUCTS OF ALL DIVISIONS**

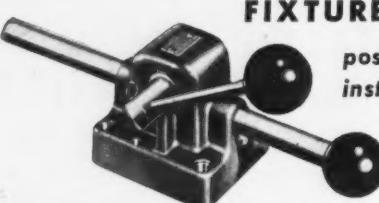
Integrated identification by means of a single trademark for the product lines of its four divisions has been announced by Giddings and Lewis Machine Tool Co., Fond du Lac, Wis. This new trademark will be applied

to all of the company's products, including those of the former Cincinnati Bickford Tool Company, Kaukauna Machine and Foundry Company and Davis Boring Tool Division.

According to Edgar L. McFerren, vice president in charge of sales: "Our identification was being diluted by a multiplicity of trademarks and trade-names. Our single, bold new trademark, we believe, will have powerful identification value and has a modern design strength in keeping with modern-day machine tools."

Products of the company which will bear the new trademark include: horizontal and vertical boring machines, vertical turret lathes, planers, planer mills, contour milling machines, die sinking machines, radial and up right drilling machines, numerical control systems, machine tool accessories, boring tools and various other related tooling items.

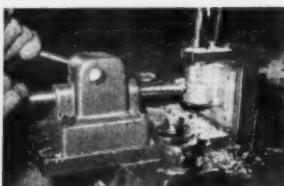
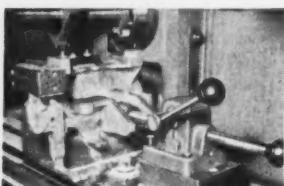
heinrich *Grip-Master*
Fixture Locks



**positive clamping
instant setting**

SIMPLIFY JIG AND FIXTURE DESIGN

LONG TRAVEL provides plenty of chip clearance, easy loading and unloading. Gets into hard-to-reach places. Base sizes: Model 2FL, 3 $\frac{3}{8}$ " x 3 $\frac{1}{4}$ "; Model 9FL, 4 $\frac{3}{8}$ " x 3 $\frac{1}{8}$ ". Bar lengths from 8" to 18". Here are two examples of Grip-Masters speeding production in drilling and milling operations.



See Your Industrial Distributor
or Send for Big, Free Catalog
on Heinrich Tools

HEINRICH TOOLS INC., DEPT. 110-B

RACINE, WISCONSIN

For more data circle 440 on Postpaid Card

186 MODERN MACHINE SHOP



New Giddings and
Lewis Trademark

February, 1960

APEX BROACH EXPANDS LINE TO INCLUDE BROACHING MACHINES

Apex Broach Company, Inc., Detroit, Michigan, recently announced that it is designing and building special and standard broach machines and presses.

The following is a list of new sales representatives for Apex: F. P. Rogers Co., 520 First Ave., South, Seattle 4, Wash., for the state of Washington; Southeastern States Engineering Co., 15329 Gulf Blvd., P. O. Box 8272, Madeira Beach, St. Petersburg 8, Fla., in the state of Florida; G. L. Marshall Co., 19 Washington St., East Orange, N. J., in northeast Pennsylvania, southeast New York and northern half of New Jersey; Mine and Smelter Supply Co., 121 West Second South St., Salt Lake City 1, Utah, in the states of Nevada and Utah, western Wyoming and southeastern Idaho; Austin Ford Logan, Inc., 1500 Kenmore Ave., Buffalo 23, N. Y., northwestern part of New York and Bradford County in Pennsylvania; Wm. S. Bolden

Company, Inc., 3414 MacCorkle Avenue, Charleston 4, West Virginia, state of West Virginia, southeastern Ohio, the northwestern borderline of Virginia and the eastern borderline of Kentucky.

Peerless Tool Service, Inc., 3628 Detroit Avenue, Toledo 12, Ohio, will cover the northwestern corner of Ohio, in addition to the counties of Hillsdale, Lenawee and Monroe, located in the state of Michigan.



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SHIMSTOCK, for instance, precision rolled from selected materials. Free of burrs or rough edges in sheets or rolls. Also Feeler Stock, Arbor Spacers and Shims ready to ship.

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AND LITERATURE

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DEPEND ON DE-STA-CO**

DETROIT STAMPING COMPANY

350 MIDLAND AVENUE
DETROIT 3, MICHIGAN

 The logo is identical to the one at the top of the page, featuring the words "DE-STA-CO" in a diamond shape.

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news of the industry . . .

NEW COMPANY FORMED

Announcement was recently made of the formation of a new company—Electra Products Company, Montgomeryville, Pennsylvania. Anthony Lipsi is president.

This firm is manufacturing Electra Heat Treating Furnaces. The Series 2000 and 2300 are general purpose, box type, electric furnaces designed for hardening, annealing, drawing, preheating and other applications requiring temperatures up to 2,000 and 2,300 degrees Fahrenheit. The Series H and D Heat Treating Furnaces feature unitized construction. Buyer may select one, two or three furnaces in one compact unit, each furnace being independently controlled. High temperatures; 2,000, 2,300 or 2,500—low temperatures; 800, 1,250 or 1,350. Any combination can be supplied—hardening; hardening and drawings; preheating, hardening and drawing.

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GARDNER-DENVER ACQUIRES APEX MACHINE AND TOOL COMPANY

An agreement to combine Apex Machine and Tool Co., Dayton, Ohio, with Gardner-Denver Co., Quincy, Ill., was jointly announced by G. V. Leece, president of Gardner-Denver, and C. A. Lange, president and general manager of Apex.

Apex will become a wholly owned subsidiary of Gardner-Denver on March 1, 1960. Apex will continue to operate under the same officers, produce the same products and sell through the same sales organization as at present.

Apex manufactures screwdriver bits and sockets for power tools. The company is also a producer of universal joints for machinery and aircraft.

Gardner-Denver manufactures equipment for construction, petroleum, general industry and mining. In its line of equipment for industrial production are power screwdrivers and nutsetters that utilize Apex bits and sockets.

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SOCIETY OF CARBIDE ENGINEERS HOLDS NATIONAL MEETING

The Society of Carbide Engineers recently held its annual meeting at the Belmont Plaza Hotel in New York City.

A slate of national officers and executive board members were elected to take office as of January 1, 1960. These were: president — Bradford Smith, Worcester Chapter; vice president — George Murphy, Hartford Chapter; secretary — Carl Erickson, Hartford Chapter; and treasurer — William Collins, Southern Connecticut Chapter.

Executive Committee: Charles Andersen, Boston Chapter; William Carr, Providence Chapter; William Hess, New York-New Jersey Chapter; Jess W. Powell, Providence Chapter; and Francis O'Sullivan, from the Hartford Chapter.

★ modern machine shop ★

LATROBE STEEL REACHES 300 MILLIONTH MILESTONE IN DESEGREGATED OUTPUT

Latrobe Steel Co., Latrobe, Pa., has produced its 300 millionth pound of desegregated tool and die steel. This production milestone, in an industry which measures output in pounds rather than tons as in other steel manufacturing, climaxes 14 years of continuous production on these specialized die and high speed steels.

The desegregated process was developed in 1945. It employs a special melting and manufacturing technique, by which carbide segregations, with or

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. . . because you can choose from over 140 models—and thirteen basic styles, or even have them adapted to your own special needs.

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news of the industry . . .

without alloy sulphides, are uniformly dispersed throughout the entire length of the ingot, rather than being segregated in clusters. It is this homogenous dispersion which gives tools and dies made of this steel greatly increased performance life and excellent heat treatment characteristics.

Latrobe Steel's entire output of this type of steel now includes some 30 analyses, which are metallurgically designed to meet specific industrial requirements. It is used in tool and die making for high production runs by the automotive, aircraft and missile industries, by metalworking shops producing hardware and component parts for appliances, and in drills, reamers, broaches and various other types of metal cutting tools.



James Burton Doan



Robert S. Alter



J. Coleman Hussey, Sr.



Arthur C. Nolte Robert H. Dunteman



John C. Hussey, Jr. Glenn R. Kraus

PERSONNEL CHANGES AT AMERICAN TOOL WORKS

Major changes have taken place in the top personnel of The American Tool Works Co., Cincinnati, Ohio, manufacturers of lathes, radial drills and special machinery.

James Burton Doan, chairman of the board since 1936 and a member of the firm for 72 years, has retired. He is 89 years of age.

One other retirement and five executive changes were also announced. Robert S. Alter, executive vice president and foreign sales manager since 1938, succeeds Mr. Doan as chairman. He has been with American since 1900. L. W. Scott Alter will continue as president.

J. Coleman Hussey, Sr., vice president and domestic sales manager, has also retired after 50 years of service.

Arthur C. Nolte, who joined American in 1936 and has been secretary and treasurer since 1954, was elected a director.

Robert H. Duntzman, office manager and service manager, has been appointed advertising manager. John C. Hussey, Jr., a 24 year veteran with the firm and currently assistant sales manager, was promoted to sales manager. Glenn R. Kraus, sales engineer

in Pittsburgh, will succeed him as assistant sales manager.

Mr. Doan joined American when the firm was Lodge and Davis. He began as an office boy in 1887, traveled for the firm in sales and later bought the company's Chicago sales office in his own name. When Franklin Alter purchased the company in 1898 as American Tool Works, Mr. Doan returned to Cincinnati as vice president

One of these Wilson "Rockwell" instruments will do your hardness testing job

No matter what your hardness testing requirements are, there's a Wilson "Rockwell" tester to do the job. Choose from this complete selection of hardness testing equipment:

"Rockwell" Hardness Tester—for most hardness testing functions.

"Rockwell" Superficial Tester—for extremely shallow indentations.

TwinTester—Combines functions of "Rockwell" and "Rockwell" Superficial testers.

Semi and Fully Automatic—for high-speed testing, at rates up to 1,000 pieces per hour. Automatically classifies pieces as CORRECT, TOO HARD, or TOO SOFT.

Special Machines—for testing large objects, internal readings, and other unusual applications.

Diamond "Brake" Penetrators—Flawless diamonds, individually calibrated, and highest quality construction assure perfect testing every time.



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Bulletin RT-58

WILSON "ROCKWELL" HARDNESS TESTERS

Wilson Mechanical Instrument Division
American Chain & Cable Company, Inc.

230-G Park Avenue, New York 17, New York

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news of the industry . . .

and general manager. He was elected president in 1916, after the death of Mr. Alter.

Mr. Doan is a former president and one of the founders of the National Machine Tool Builders' Association, a director of Armco Steel Corp., Ohio National Life Insurance Co., First National Bank of Cincinnati, Chil-

dren's Home and Bethesda Hospital. He is chairman of the trustees of Walnut Hills-Avondale Methodist Church.

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**ENGELHARD FORMS
INDUSTRIAL DIAMOND DIVISION**

Engelhard Industries, Inc., 113 Astor St., Newark 2, N. J., recently announced the establishment of its Industrial Diamond Division. This division will

import, stock, process and sell natural industrial diamonds in the U.S., provide technical service to present and potential buyers and users of diamonds, and engage in basic research and application engineering investigation in order to expand the use of natural industrial diamonds.

The Industrial Diamond Division will import and inventory substantial supplies of industrial diamonds so that from now on, any manufacturer of diamond wheels or tools can buy his diamond requirements in the U.S. and get immediate shipment from stock. This will establish the same seller-buyer relations in this market as exist in the market for

new

U.S. MILLRITE VERTICAL MILL

ACCURATE • BIG CAPACITY • RUGGED



\$990*

16" table feed, 12" ram adjustment, 15" vertical knee movement,
8" crossfeed, 12" ram movement. 4" quill travel.
Hard chromed quill, hand scraped and precision ground ways, accurately finished to accepted machine tool standards.
Built in Cincinnati to sell for just \$990.00—less 3/4 H.P. electicals.*

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Cincinnati 27, Ohio

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other major industrial materials. Buyers of diamonds can count on a steady, uninterrupted supply. In addition, substantial inventories will eliminate the traditional need for the accumulation of large inventories by diamond purchasers or diamond users. Under consideration are plans to supply grit of any specific size in quantity, including the regular natural grit, selected natural grit (SND) and the new treated grit. To service buyers and the consumers of industrial diamonds, the Industrial Diamond Division is instituting a technical service capability, which will make available the kind of application know-how that will contribute to the most effective and most economic use of natural industrial diamonds.

★ m m s ★

N.A.M. APPOINTS NEW HEAD

The new president of the National Association of Manufacturers, Rudolph Frederick Bannow, is president of Bridgeport Machines, Inc., manufacturer of high speed milling attachments and turret milling machines. Born in Goteborg, Sweden, Mr.

Bannow came to the United States at age 13 to join his mother, brother and sister. He completed his grammar school education in Holyoke, Mass., and then went to work as an apprentice patternmaker, at 6½ cents an hour at the Deane Steam Pump Company. In 1919 he worked on a freighter shoveling coal.

He worked at various plants and then became foreman of the Bridgeport Pattern and Model Works, at the

Severance ELECTRODE DRESSING CUTTERS			
	<p>Used by many to re-condition Electrodes without removing from machines—</p> <p>Down-time is Slashed!</p> <p>Production is Increased!</p> <p>Designed to fit most all popular Electrode Dresser power tools.</p> <p>Special shapes quickly made up.</p>		MIDGET MILLS
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	REGRINDING SERVICE		
<p>INVESTIGATE!</p> <p>It may pay you much!</p> <p>ASK FOR MORE INFORMATION TODAY!</p> <p>Severance TOOL INDUSTRIES INC. 724 IOWA AVENUE SAGINAW, MICHIGAN</p>			

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news of the industry . . .

age of 23. At the age of 30, he bought the works, using his savings and a loan of \$3,000. Two years later, he and Magnus Wahlstrom, a tool maker, formed Bridgeport Machines, Inc.

In his new activity as president of N.A.M., Mr. Bannow will travel two weeks of every four, making speeches on his views of the national economy.

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**W. O. BARNES APPOINTS
VICE PRESIDENT-CHIEF ENGINEER**

Oran W. Thompson has been appointed vice president-chief engineer of W. O. Barnes Company, Inc., De-

troit, Michigan, manufacturer of hand power and band saw blades.

Mr. Thompson has been with Barnes for nine years as chief engineer. He has been associated with the saw blade industry for over nineteen years.

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**MICROMETRICAL EXPANDS
EXECUTIVE STAFF**

The rapidly expanding program of research, development and production of Micrometrical Manufacturing Company, Ann Arbor, Michigan, has made it necessary to enlarge the firm's executive staff to provide leadership for continued growth.

Announcement was recently made of the formulation of a policy making

New 40-TON DOUBLE CRANK O.B.I.
Rousselle



WITH NEW ELECTRICALLY
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- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

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body, to be called the Executive Group. Several new posts were created, increasing the group to six members. They are as follows: Marion E. Abbott, owner; Fritz A. Zander, general manager; Frank W. Kabat, sales manager; William E. Pengelly, office manager; Charles H. Good, plant manager; and Donald Parkes, chief engineer.

It is expected that the firm's new \$350,000 plant and office building, now under construction at 3621 South State Road, Ann Arbor, will be ready for use sometime in April.

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GISHOLT APPOINTS SECRETARY

The Gisholt Machine Company, Madison, Wisconsin, has announced the appointment of Henry R. Holm from assistant secretary to secretary.

Mr. Holm came to the Gisholt organization in 1936 and became assistant secretary in 1953.

ACCURACY is an ECONOMY!
and only precision offers you
HIGHEST QUALITY!

**now is the
time
to put your
OLD STEEL
PARALLELS to "LIKE NEW"**

conditions and to be ready for the big push.

For the first time Anton Machine Works offers to regrind your old parallels to the following tolerances:

- Parallelism and straightness over length of 6" $\pm .0001$.
- Size tolerance between a pair $\pm .00005$. A complete list of new parallels in stock will be mailed on request.

ANTON MACHINE WORKS

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NOTHING heats like...
is more modern than...
is more economical than... **GAS**

NO BLOWER OR POWER NEEDED

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HIGH SPEED FULL MUFFLE FURNACES
Bench type for heat treating high speed and alloy steels. Temperatures to 2400° F.

INDUSTRIAL GAS BURNERS & FURNACES
for Clean, Fast, Quiet Heat-Up at Lowest Cost!

LARGE FLOOR TYPE OVEN FURNACES
For universal heat treating of larger pieces. Temperatures to 2000° F.

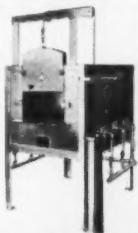
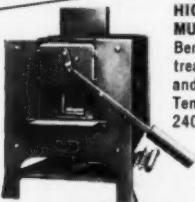
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141 So. Grand Avenue, Baldwin, L.I., New York • BALdwin 3-1110

"BUZZER" Burners & Furnaces for Heat Treating, Melting, Soldering

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NEW equipment

**Descriptions of new machines, tools
and materials for metalworking.**

Edited by L. L. BALDHOFF

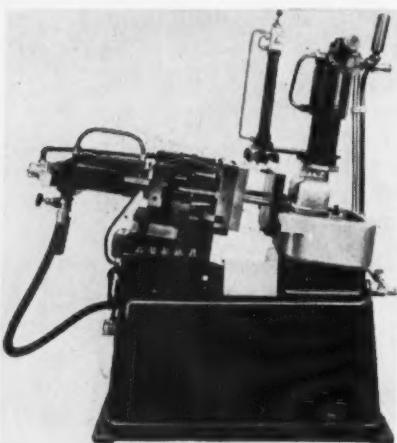
AUTOMATIC CYCLING DIE CASTING MACHINE IS PUSH-BUTTON CONTROLLED

A low cost, single cycle automatic die casting machine is introduced by DCMT Sales Corp., Dept. K14, Port Washington, N. Y. The DCMT MAC 99 is push-button controlled, with

quick-attach electronic timer unit for single cycle automatic operation. This has a completely new solenoid operated valve system, with two way speed control for die setting and shockless operation. Exhaust mufflers are provided as standard equipment for quiet cycling.

The base is broad and husky, for better stability. It has a four way adjustable die unit and spacer plate: (1) tie bars placed horizontally and spacer plate removed for center shot, (2) tie bars placed horizontally with spacer plate for below center shot, (3) tie bars placed vertically and spacer plate removed for center shot, (4) tie bars placed vertically with spacer plate for below center shot.

For more data circle 81 on Postpaid Card



Automatic Cycling Die Casting Machine

AUTOMATIC GRINDING MACHINE FOR METAL-CUTTING SAW BLADES

W. Von Arnauld Co., 95 Grove St., Oakland, N. J., announces the Tempo Automatic Saw Blade Grinding Ma-

and materials

chines for all kinds of metal cutting saws. The latest in this Tempo Line is the Model AS-12, for grinding segmental and carbide tipped circular saws with an increased capacity of up to 49 inch circular saw diameter. There have been some design changes to make the machine capable of indexing exactly on the same tooth to be ground. It is an important matter when grinding carbide tipped saws to be able to neglect spacing errors, which may occur due to the brazing of the carbide tips. Independent motors are used for the drive and the grinding spindle of the machine.

Eight index speeds are available. All Tempo machines are equipped with a shift arrangement to grind either straight or curved tooth profiles. They have another arrangement for automatically grinding Hi-Low Triple Chip Teeth, adjustable by a turning knob with a micrometer scale, reading in 0.0001 inch increments, as well as for chamfering each second tooth of the saw blade.

The Tempo machines are of high performance and workmanship. For grinding dust protection, the gear box is totally enclosed and sealed. Automatic lubrication is provided for all gears and moving parts. A grinding dust extractor is claimed to keep the

machine absolutely clean at all times.

According to the manufacturer, the Tempo Automatic Saw Blade Grinder is designed and built to provide many years of dependable service without any maintenance.

For more data circle 82 on Postpaid Card



Tempo Automatic Saw Blade Grinder

new equipment . . .

BED TYPE MILL IS AVAILABLE IN 14 MODELS AND 34 COMBINATIONS

George Gorton Machine Co., 1710 Racine St., Racine, Wis., has announced its "Bedmill," a machine which is available in 14 models and 34 combinations. Designed for the aircraft and missile fields, it will prove useful to plastic mold shops and all those engaged in making coining, drop forging and die casting dies. It will perform as a production profiling machine, duplicator in three dimensions and as a conventional milling machine.

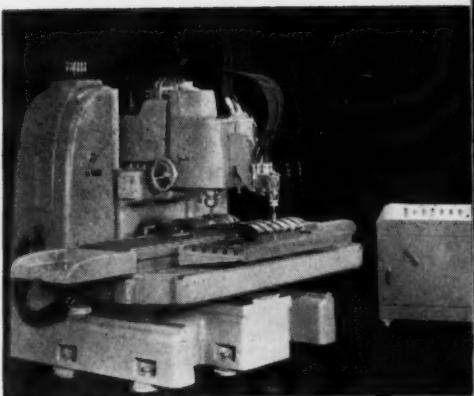
Features are hydraulic, electro-hydraulic (automatic) tracer control or numerical control in combination with the proven stability, ruggedness and long-lived accuracy of a bed type machine.

The basic machine lends itself to many different combinations of speeds and feeds—electrical and/or hydraulic to meet differing requirements.

The heavy base casting is more than 6 feet square and rests on ten leveling screws. The 84 inch saddle rides on a wide center bearing and on outboard bearing rollers (adjustable for wear) and travels on hardened and ground outboard supports which provide a bearing spread greater than the table travel.

A large tool tray is attached to each end of the table for operator convenience and the machine table and master table are both mounted horizontally and in front to facilitate loading and unloading.

This Gorton Bedmill is available with a hydraulic spindle of from 15 to 40 h.p. Feeds can be specified as all hydraulic, screw or a combination of hydraulic and screw. Spindle speeds vary according to horsepower—215 to 3,000 r.p.m. for the 15 h.p. model and 37 to 3,000 r.p.m. for the 40 h.p. model.



Gorton Bedmill is available in 14 models

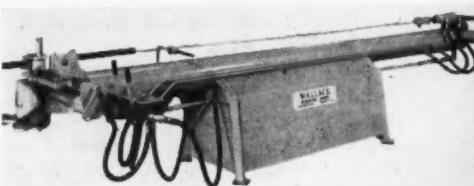
The Gorton Bedmill is built only on special order, according to the specific requirements of the purchaser.
For more data circle 83 on Postpaid Card

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BENDING MACHINE

Wallace Supplies Mfg. Co., 1804 West Cornelia Ave., Chicago 13, Ill., introduces the S-M (Section Modulus) bending machines for pipe, tubes, angles, channels and other structural shapes in any bendable metal; also rolled or extruded special shapes.

The S-M Benders are available in four sizes, designed for handling work from 0.6 SM (approximately 2 inch standard pipe) to 18.0 S-M (approximately 8 inch standard pipe).



View of the Wallace S-M Bending Machine

The machine features hydraulic power—90 degrees—plus springback on one setting, (180 degrees plus springback on a second setting). It is a practical unit for most shops because approximately 85 to 90 percent of all bends are made 90 degrees or less. It is available with or without mandrel units and a clamping and power pressure die movement is available.

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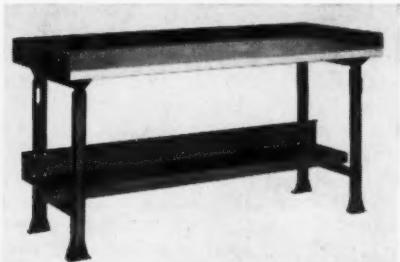
WORK BENCHES WITH PLASTIC IMPREGNATED TOPS

American Metal Works, Inc., Bay Products Division, 1825 West Cambria St., Philadelphia 32, Pa., announces the availability of work benches with a new type of top that features a wood-phenolic resin panel on each face applied over a softwood core. This construction produces a quiet, durable, non-skid and non-conductive working surface which has the added advantage of being less expensive than laminated hardwood tops.

Other bench parts are all steel, finished in forest green baked enamel. Bench legs are adapted for electric socket mounting with no-drilling wiring installation.

Both 5 and 6 foot widths are available in 30 inch depths.

For more data circle 85 on Postpaid Card



This work bench features a new type top



U. S. Vertical Mill has new swivel head

COMPOUND SWIVEL HEAD ADDS UNIVERSAL FLEXIBILITY TO VERTICAL MILL

A compound swivel head is announced by U. S. Burke Machine Tool Co., Brotherton Rd. at Pennsylvania R.R., Cincinnati 27, Ohio, for the U. S. Millrite full size dovetail ram and turret vertical toolroom milling machine. The swivel provides for double angle settings, increasing even further the unusual range and capacity of this economical mill.

Recessed mounting of the swivel on the ram overarm minimizes overhang, maintaining balance and rigidity. To facilitate angular settings, a protractor type scale is provided.

Equipped with the compound swivel, this vertical mill provides universal flexibility, yet maintains accuracy to accepted machine tool tolerances and increases its productivity for precision milling and boring operations.

With the compound swivel overarm, throat distance, spindle to column

new equipment . . .

face, is 17 inches maximum, 6½ inches minimum; maximum distance from the nose to the top of the 7 by 27 inch table is 18 inches. Table feeds are: longitudinal 16 inches, crossfeed 8 inches. There are 15 inches of vertical knee travel with ram movement of 12 inches and quill travel of 4 inches.

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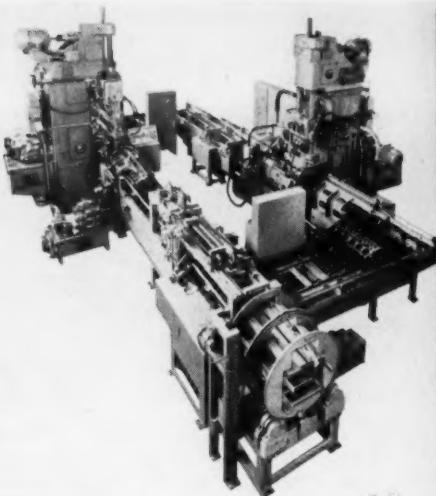
TRANSFER LINE HONES V-6 AND V-12 MOTOR BLOCKS

V-6 and V-12 motor blocks are automatically honed on a new honing transfer line, designed by Barnes Drill Co., 860 Chestnut St., Rockford, Ill. Vertical type honing machines are used with fixturing designed to tilt the vee shaped motor block, so that the bore is in a vertical position for honing.

One six spindle machine is designed to hone two V-6 blocks at one time, and a three spindle machine hones the V-12 block. The two units do not operate simultaneously. Immediate changeover from V-6 to V-12 honing takes place as production requires. Both units are equipped with air counterbalance for smooth action, and a safety interlock holds the head in position while work indexes or when stones are changed.

BarnesdriL Plungmatic sizing maintains size consistency within 0.0003 from bore to bore. The pneumatic hone feed mechanism is equipped for rapid expansion, rapid collapse and automatic compensation for stone wear. With stock removal of 0.002 to 0.0035, finish is held at 15 to 25 r.m.s. Previous machining is a fine boring operation.

The three spindle machine for the V-12 block is designed to hone three bores, index to hone the next three bores, automatically rotate and hone three bores and index to the original



BarnesdriL Transfer Type Honing Machine

position to hone the last three bores. The six spindle machine hones three bores in two V-6 blocks at one time, rotates and hones the remaining three bores in each block. A roll fixture rotates the blocks to remove surplus coolant.

For more data circle 87 on Postpaid Card

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METHOD CUTS COSTS FOR GRINDING MULTIPLE DIAMETER SHAFTS

Landis Tool Co., Waynesboro, Pa., states that significant savings in grinding costs are being shown on its grinders with the newly developed Landis Size Finder. This development cuts setup and operating time for precision grinding shafts with two or more different diameters. Small to medium size lots of multiple diameter shafts for machine tools, electric motors, pumps, compressors, food machinery, construction machinery and similar equipment are ideal for this machine. Con-

centricity between diameters is improved over methods where workpieces are racked between operations.

The Size Finder is a direct reading counter, which is calibrated to the grinding wheel feed handwheel on new Landis Grinders. Any diameter to be ground, within the range of the machine, can be dialed on the Size Finder by turning the handwheel. This eliminates the need for counting graduations of the handwheel to set the grinding wheelhead to a given position. The possibility of spoilage is practically impossible, since calculations by the operator are not needed.

Landis Microfeed is used on Size Finder machines to automatically cancel all grinding feed variables. Microfeed advances the grinding wheel head in 50 millionths inch increments after sparkout to finish size, as indicated by the sizing gage.

The operation is simple, even for semi-skilled operators. The grinding wheel is first calibrated to the Size Finder by dressing. Sizing gages are set for each diameter to be ground. From this point on, the operator turns the wheel feed handwheel until the finish dimension to be ground appears

on the face of the Size Finder. The operator initiates the automatic grinding cycle and applies the preset sizing gage for the particular diameter being ground. When the indicator shows finish size has been reached, the operator retracts the wheelhead.

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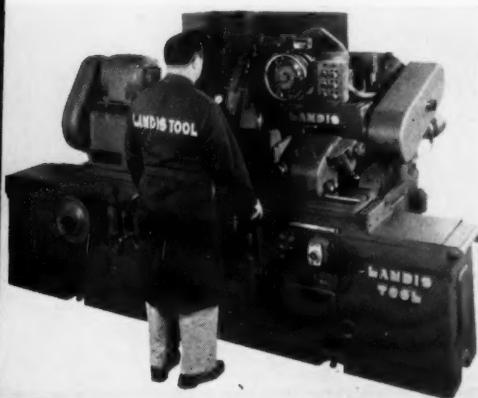
IMPROVED AIR POWERED MARKING MACHINE

Acromark Co., 9 Morrell St., Elizabeth 4, N. J., states that 75 p.s.i. and up provides power for an improved Model 9A Marking Machine. Suited to operation from the standard air-line common to mostly every plant, this quiet operating, high production, general purpose machine, meets most marking needs of medium and small parts manufacturers.

The air cylinder has been purposely designed and developed to provide ample power in a minimum of space. The stroke of the machine is 6 inches but may be up to 14 inches in the extended model.

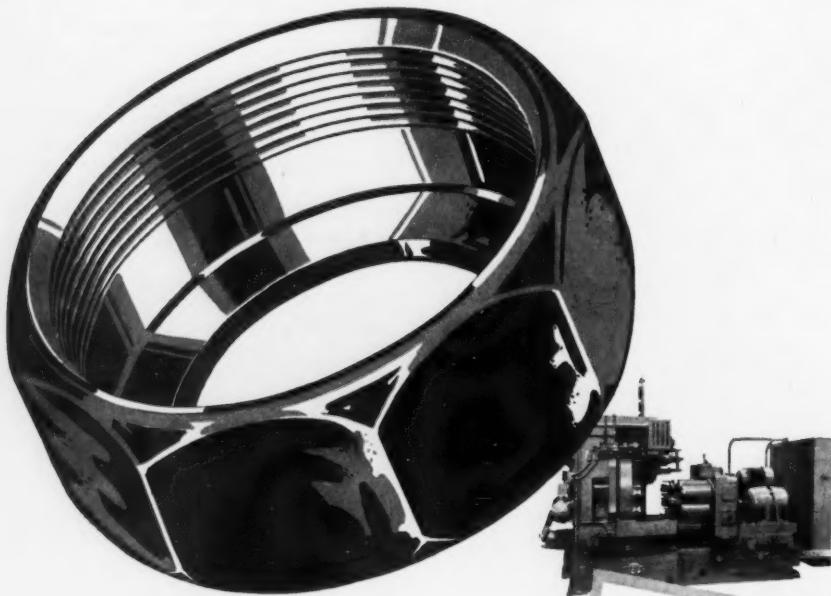
Designed for maximum adaptability, with open back to handle long (deep) work and with overhanging head to handle work requiring "front swing," this improved marking machine meets all general requirements. It utilizes the rotary "point of contact" principle, for highest engineering efficiency. Roll dies mark flat parts and flat dies mark round and cylindrical parts. The "point of contact" principle eliminates the need for massive equipment for "one impact" marking of an entire area. This improved method provides greater pressure with smaller equipment by "accumulative marking," rather than heavy impact and, thus, does not break down or weaken the marked product.

The clearing under the marking head is 6 inches front and $3\frac{1}{2}$ inches rear. Solid engraved marking dies or



Landis Plain Hydraulic Grinding Machine

...an example of Automatic Production by Greenlee...



700 malleable iron pipe fittings an hour...

The Greenlee 5 station, horizontal, automatic indexing machine shown above was designed and built for high-production machining of malleable iron pipe fittings. The pipe fittings are loaded, four at a time, indexed and machined at the rate of 576 to 712 pieces an hour, depending on size. The machine accommodates five different sizes of fittings.

- STATION 1 — automatic load
- STATION 2 — bore and rough counter-bore
- STATION 3 — finish counter-bore and chamfer
- STATION 4 — tap
- STATION 5 — automatic unload

Let a Greenlee representative show you the modern Greenlee approach to automatic production.

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WITH THE FUTURE IN MIND



TRANSFER MACHINES

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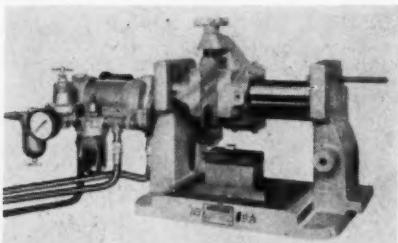
- Multiple-Spindle Drilling and Tapping Machines
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- Hydro-Borer Precision Boring Units
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new equipment . . .



Acromark Air Powered Marking Machine

holders with type or inserts may be used. The overall size of the machine is 33 inches wide by 16 inches high by 14 inches deep and the shipping weight is 285 pounds.

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POWER DRIVEN STRAIGHTENER

U. S. Tool Co., Inc., Ampere (East Orange), N. J., announces its Model

No. PDS-16H Power Driven Straightener, with capacity for material up to 16 inches wide and up to a maximum of $\frac{1}{4}$ inch thick (cold rolled steel, hot rolled steel, brass, copper, aluminum).

This unit is designed for the removal of coil set from material in coil form, usually used in conjunction with automatic feeding equipment for advancing the material into punch presses, press brakes or other fabricating equipment. The straightener is arranged with a pair of power driven take-in rolls, six straightening rolls (4 inch diameter on 6 inch centers, upper three individually adjustable, lower three power driven), a pair of power driven take-out rolls, quick release on take-in and take-out rolls, all rolls hardened and ground and mounted in bronze bearings, all rolls driven by hardened gears; loop control with electric clutch, casters for portability; 5 h.p. variable speed drive unit with outputs from 10 to 50 feet per minute.

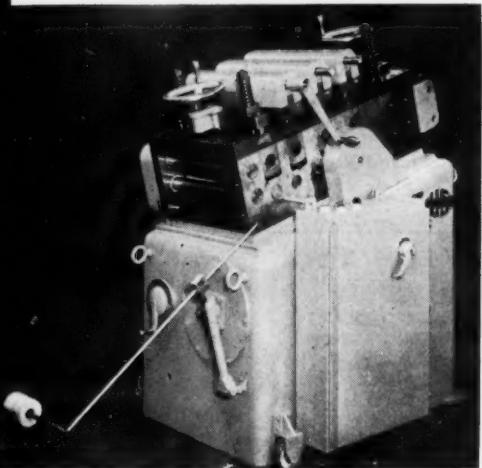
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INDUCTION HEATING EQUIPMENT

Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside, N. Y., has developed a capacity device for the most efficient energy transfer, to be connected between a high frequency generator and a low impedance work coil. Details of this unit are shown in the inset.

The Lepel CT Matching Unit is modular designed with a heavy copper terminal of low impedance and high current-carrying capacity for attaching to either the induction heating coil directly or to coaxial leads. Each section is rated at 100 kva in the frequency range of 100-750 kc per second. CT Matching Units are available in 1, 2, 4, 6 and 8 sections, rated at 100, 200, 400, 600 and 800 kva respectively. Combinations of parallel and series

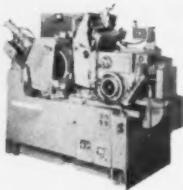


Model PDS-16H Power Driven Straightener

new equipment . . .

connections between the individual sections provide several ranges of impedance, permitting efficient matching to even the smallest induction heating coils.

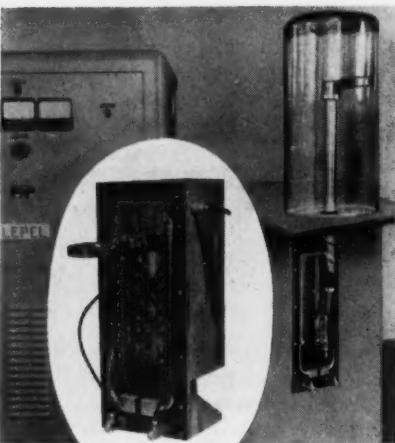
The illustration shows the use of the CT Unit with coaxial leads for transmission into a bell jar. This arrange-



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Lepel Induction Heating Equipment

ment permits operation at the lowest voltage consistent with the power demand and frequency of operation. Use of this unit with coaxial leads also allows placement of the induction heating coil and work at remote distances from the generator.

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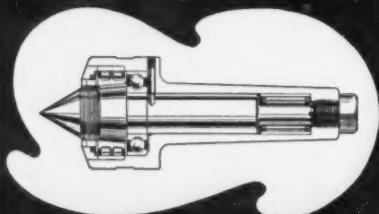
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February, 1960

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This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

SHELDON MACHINE CO., INC. 4250 No. Knox Ave., Chicago 41, U.S.A.

Gentlemen: Please send me information on items checked.

- The NEW and DIFFERENT SHELDON 15" Lathes
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- Sheldon 12" Shaper
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new equipment . . .



The Mauser Vernier Caliper Number 193

ed by Scherr-Tumico Co., 200 Lafayette, New York 12, New York.

The Mauser Vernier Caliper No. 193 eliminates the troublesome parallax of the standard type vernier by using a flush type vernier. Reading thus becomes practically foolproof. Eye strain is at the same time considerably reduced by the lustro chrome finish on both scale and verniers, the

length of which has been doubled for even greater accuracy.

Should recalibration and adjustment be needed on either lower or upper vernier, both vernier plates are independently adjustable (up to 0.020 inch). A fine cam-lock adjustment is provided for easy setting at close limits.

The 193 Mauser Caliper is made entirely of stainless steel, hardened throughout. Designed for outside, inside and depth measuring, it has a maximum capacity of 6 $\frac{1}{4}$ inches with 0.001 inch reading on both lower and upper scales and an overall length of 9 $\frac{1}{8}$ inches.

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A hardness tester, which automatically removes major testing loads, is

DRILL HARDENED STEELS WITHOUT ANNEALING —



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon - high chrome steels of any degree of hardness. "HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly. Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" Drills are cutting costs in thousands of plants.

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Speed your riveting production with Linley Noiseless Riveters. We'll give you, without obligation, cost and time estimates of doing it the Linley way if you'll send us samples of parts to be riveted. Linley Riveters will do rivets up to $\frac{3}{8}$ " in diameter in iron and cold rolled steel; larger sizes in brass, aluminum, etc.

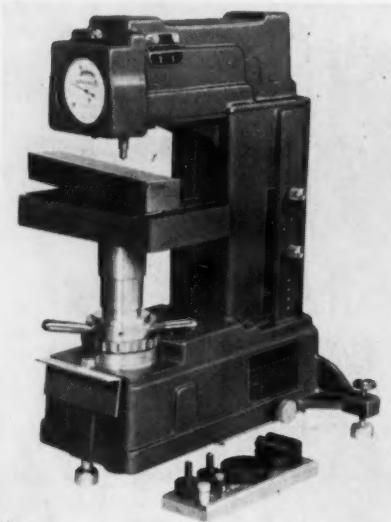
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new equipment . . .



Torsion Motorized Hardness Tester

announced by Torsion Balance Co., Clifton, New Jersey.

Known as the Motorized Kentrall Hardness Tester, this machine eliminates much of the effect of operator technique. It also gives greater reproducibility of test results and cuts down on operator fatigue.

The Motorized Kentrall is available as a combination tester, which provides both regular and superficial Rockwell hardness testing in a single machine. For those applications that do not require the additional range, the Motorized Kentrall is also available as a single purpose tester for either regular or superficial testing.

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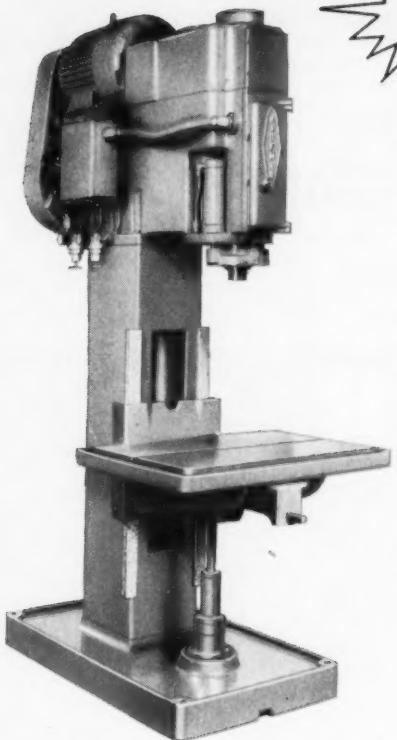
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RADIUS DRESSER IS IMPROVED

Somerset Tool Co., 320 Virginia St., Hillside, N. J., announces the newly

FOR HIGH SPEED PRECISION TAPPING CHOOSE THE

KAUFMAN



MODEL 10E-20

Six features of this new, precision-built Kaufman Tapping Machine are:

1. Lead screw control for accurate threads and maximum tool life. Maximum $4\frac{1}{2}$ " lead screw travel.
2. Rapid approach of spindles to work.
3. Clutch operated for faster operation — Reversing spindles at twice forward speed.
4. Six speed transmission providing spindle speeds of 80-350 RPM with 3-1 ratio or 160-700 with $1\frac{1}{2}$ -1 ratio clutch.
5. Units provided with 5- $7\frac{1}{2}$ -10 H.P. Motors.
6. Speeds and H.P. available for highly efficient tapping from $\frac{5}{16}$ " through 2" NC taps or smaller taps with use of multiple head.



For additional information about the new Model 10E-20 or other Kaufman machines for single or multiple operation, write or telephone:

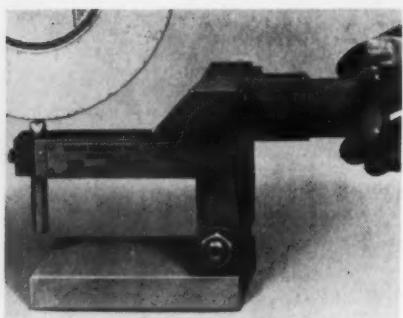
KAUFMAN MFG. CO.

551 S. 29th Street.

Manitowoc, Wisconsin

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new equipment . . .



The Somerset Model SS Radius Dresser

engineered and redesigned Model "SS" Radius Dresser. It maintains an accuracy of 0.0002 inch.

The new Model "SS" has an enlarged capacity, dresses all abrasive

wheels up to and including 12 inches in diameter. The need to remove the wheel guard is eliminated, because the wheel is dressed from below. Open and easy-to-see operation means that convex, concave and complex combination shapes are easily and quickly dressed by even inexperienced operators.

Four stop pins allow complete adjustment from 90 through 180 degrees. The diamond dressing point is easily set by measuring with a micrometer from the top of the measuring hood to the bottom of the dresser arm. For more data circle 94 on Postpaid Card

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INCREASES LATHE OUTPUT**

An instrument, called the Distorimeter (Model 555 B-245), provides the lathe operator with a fast, convenient, reliable means of spotting tool

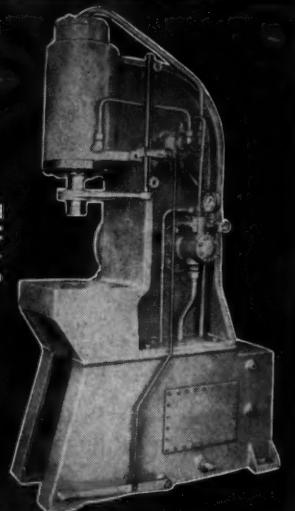
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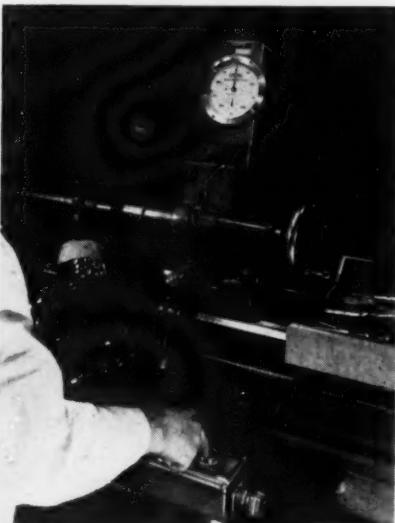
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212 MODERN MACHINE SHOP

new equipment . . .

position and directly measuring longitudinal cutting distance. This instrument is marketed by Federal Products Corp., 91411 Eddy St., Providence 1, Rhode Island.

With the Distometer, the operator has a constant guide which operates over the full travel of the lathe carriage, can be referenced instantly at any point in the travel with pushbutton zeroing and can measure movement continuously to any other point. Dial graduations are in increments of 0.002 inch and the range per revolution of the pointer is 0.500 inch. A revolution counter is divided into ten segments, each of which represents one complete revolution of the large hand. There is no need for the operator to hold scales, adjust dials, or take time out to master against gage blocks. The Distometer is mounted on the lathe carriage, so that it travels with the tool. It is actuated by its



Distometer Direct Measuring Instrument

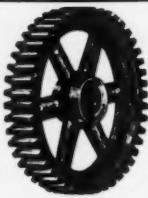
February, 1960

JIG GRINDING and JIG BORING to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.
ROUTE 22, MOUNTAINSIDE, N. J.
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GEARS

In Stock—Immediate Delivery

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Send for Complete Catalog No. 20
CHICAGO GEAR WORKS
440-50 N. Oakley Blvd., Chicago 12, Ill.

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Troubled by Withdrawal Marks?

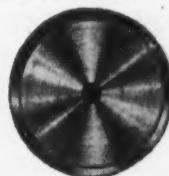
the new RELIEVOMATIC* saves you costly refinishing!

No more rejects or refinishing because of marred surfaces made by cutting tools on their return pass! Now—the RELIEVOMATIC renders precise parts with perfectly smooth surfaces. For boring, turning or facing on automatic metal turning equipment.

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normal marred surface
* U.S. Patent No. 2,712,767



perfectly clear surface
with RELIEVOMATIC!

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For extreme accuracy under heaviest radial and thrust loads...

Specify **RED-E** ANTI-FRICTION
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LATHES:
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GRINDERS:
22 MODELS

Stocked in all standard taper sizes and straight shanks. Immediate delivery on head sizes up to 12" dia.

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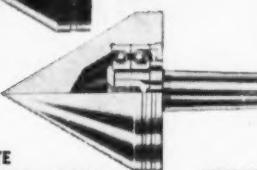


READY TOOL COMPANY

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Model
HD-500-700
illus.



FEATURE: 3 & 7 ABEC-SPEC bearings. Heads made of chrome nickel steel, hardened for greater resistance to abrasion wear. HD model has an adjustable bearing assembly with positive locking control.

OTHER HEADS AND SHANK SIZES AVAILABLE

180 Garfield Ave.
Stratford, Conn.

new equipment . . .

movement along a stationary tape, mounted rigidly to the lathe bed. The Distometer is equally effective whether cutting shoulders, grooves or bores.

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SHEARS HAVE NEW POWER BACK GAGE

Cincinnati Shaper Co., Cincinnati 11, Ohio, announces a new type of power back gage for its shearing machines. Important features of the



This shear has a new type power back gage

NEW ADJUSTABLE BURRING TOOL . . .
a handy vest pocket scraper and burring instrument. Blades are fully retractable, replaceable and easily sharpened. Cutting length adjustable to 3", can be reversed to use either end. Made from hi-quality, hi-speed tool steel for long life. Ideal for burring in aircraft and other light metal operations—overall length 4½".
Complete \$2.54 ea. Min. order 6. Blades \$12.50 doz.
Write for Additional Information.
Dealer Inquiries Invited.
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Cincinnati front controlled power back gage are: (1) back gage control buttons and gage setting indicating dials are built into one unit; (2) large, easy-to-read counter type dial, which shows the back gage setting directly in inches and sixty-fourths; (3) control unit is conveniently located directly in front of the operator. The back gage setting dial is at a level easy to read—the control buttons are easy to reach; and (4) heavy steel frame protects dial and control buttons against damage from crane supported work.

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PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS,
PLANERS AND BORING MILLS

Range: $\frac{1}{8}$ " to 3" for con-cave radii on lathes.
Two sizes for con-
vex radii (Balls up
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lathes. Also heavy
duty model for radii
to 6" on planers,
etc.



Patent Pending

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Above Postpaid Except C.O.D. Charges
 OPTICAL TANGENT ANGLE & RADIUS
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**1° TO 90° MAGNETIC ANGLE SQ. PIN ANY
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 SURFACE PYROMETER
 Send for FREE catalog No. 168.
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**Minimum Overhang
 with this
 SPRING LOADED
 LIVE CENTER**

This Needle Bearing 60°
 Niro® Center is constructed with heavy rugged spring which automatically compensates for work expansion due to heating, and avoids the continual resetting of the tail-stock. Extremely small overhang reduces vibration and chatter. Rugged, neat, compact.

Many other outstanding features exclusive with Niro. Get the whole story including sizes, tapers and prices by writing to:

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 901 Highway 22, No. Plainfield, N.J.

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tapped parts

pass

inspection

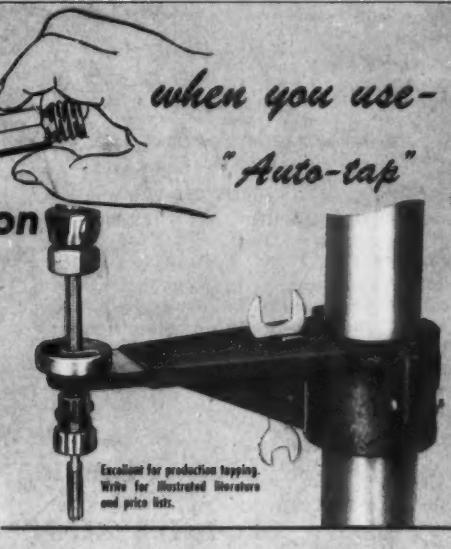
the new
 lead screw
 tapping
 attachment used with
 any
 standard
 reversing
 head

PRODUCT OF
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February, 1960



Excellent for production tapping.
 Write for illustrated literature
 and price lists.

BROOKLYN 37, N. Y.

new equipment . . .

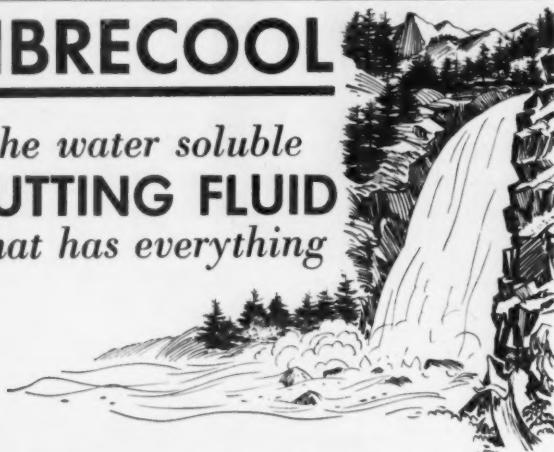
HAND METAL BENCH PUNCH

Whitney Metal Tool Co., 720 Forbes St., Rockford, Ill., announces its No. 118 Whitney-Jenson Hand Metal Bench Punch, which offers these features: (1) Adjustable ram (3/16 inch total adjustment). This reduces punching pressure by allowing the operator to adjust the punch so it just enters

the die, enables the operator to use small forming dies, rigid tolerances can be held and punch and die life is greatly extended. (2) Throat depth of 7 inches and throat height of 4 1/2 inches greatly increases the number of jobs this bench punch can handle. (3) It will punch a 2 inch hole through 14 gauge mild steel or a 1/4 inch hole through 3/16 inch mild steel. This capacity is possible by the use of a power press type ram. Easy operation is assured through an eccentric cam, rolling on a heavy duty roller bearing. (4) Removable and adjustable die shoe for close fitting punches and dies. (5) This punch will take a variety of forming dies, such as electrical outlet knockout punches and dies, keyhole punches and dies, corner trimming

FIBRECOOL

*the water soluble
CUTTING FLUID
that has everything*



- TRANSPARENT, DOESN'T HIDE WORK.
- COOLS WHILE IT LUBRICATES.
- ACTUALLY PROTECTS FROM RUST.
- NO FOAMING, NO STICKING, NO GUMMING.

FISKE'S FIBRECOOL Cutting Fluid will help you lower costs through heavier cuts, higher speeds and longer tool life. WORK PROVEN. Produces better finishes in both cutting and grinding. Send for bulletins. Write today.



**METAL WORKING
LUBRICANTS**

FISKE BROTHERS REFINING CO.

129B Lockwood Street, Newark 5, N. J.

Plants: Newark 5, N. J. Toledo 5, Ohio
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No. 118 Whitney-Jensen Bench Punch

February, 1960

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}$ " to $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



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EXPERIMENTAL DEVELOPMENT

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STEEL BLUE**

Stops Losses

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Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
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Increases efficiency and accuracy.

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**Save Time, Money
and Labor with
DURO
DRILL
PRESSES**

Duro Drill Presses are precision units, offering extra capacity, extra features at no extra cost! It is the only line that permits "custom selection" from the largest array of models in the power tool field. The Duro Line includes single and multiple units, in $1\frac{1}{2}$ " and 18" sizes, with or without production tables and bases, with optional foot feeds, in bench or floor models. Each unit has sealed-for-life ball bearings, precision bored bearing seats, ground alloy spindles, vibration free head castings, sturdy cast hinged belt and pulley guards; adjustable feed tension, plus many others.

Write for FREE Power Tool Catalog

DURO Metal Products Co.

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68 Models

get the right drill press
for the right job at
the right price

new equipment . . .

punches and dies and so on. (6) Auxiliary attachments include a work table with adjustable stops and a three shelf floor stand. (7) Furnished with the punch as standard equipment are the following: one $\frac{1}{2}$ inch punch and die, two die adapters for dies with $1\frac{1}{4}$ inch o.d. and dies with $2\frac{1}{8}$ inch o.d., one punch holder which allows the use

of 1 or 2 inch shank punches, stripper arms and plate and one die shoe that will take both adapters.

For more data circle 97 on Postpaid Card

★ modern machine shop ★

PIN TYPE MAGNETIC BLOCKS

Glover Mfg. Co., 423 Park Ave., Meadville, Pa., is marketing new pin type magnetic blocks for grinding angles rapidly and accurately. These blocks are de-

signed to save setup time in grinding angles. Blocks are available in an 11 piece set, aluminum with $3/16$ square steel pins, constructed to last for years. Features include: all angles, 1 through 90 degrees; can be used on any type of chuck because of the new pin type design; can be used in any direction on the magnetic chuck; no complicated setups, no gage blocks required; will hold unusually small work.

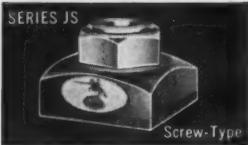
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If you are

Easy to install, easy to adjust, Empco Leveling Jacks provide a solid foundation for machine tools, automation lines, large surface plates, tool room and production equipment of all types. Used with Vi-Sorb Mounting Pads, they further reduce vibration, retard creepage, often eliminate the need for anchor bolts.



6 STYLES; 25 MODELS



Screw-Type

USING, BUYING, OR PLANNING TO BUY . . .

MACHINE TOOLS

... you'll want to know how Empco Leveling Jacks will protect your investment, give you better machine performance, longer machine tool life. Write for Bulletin No. 100.

Please send Bulletin No. 100.

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Address _____

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Magnetic Blocks



**SPEEDY-SAFE
NON-POISONOUS
CASE
HARDENING**

Indispensable for Tool Rooms, Machine Shops, Schools, etc. Now available in 1, 5, 10, 25, 50 and 100 lb. containers. Write for Free Catalog.

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C A M S

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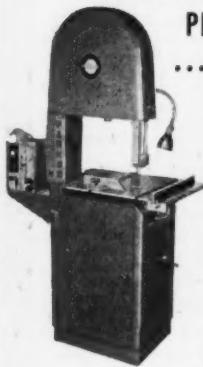
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**The Universal Cutting Machine
PARKS M-2 18" Band Saw**

Cuts METALS - ALLOYS
PLASTICS - WOOD
*... and it costs
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Here is a rugged, precision-built machine that will cut any materials you work...at the speed best suited for that material—from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial saws.

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Manufacturers of Quality Machines Since 1887

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February, 1960

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IT'S OPEN IN A JIFFY!**



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SHIPPING BAGS**

*Completely
Redesigned!*

★ Tear Tape Opener —

★ Golden Clupak®
Outer Liner —

★ New Bag Construction

★ NO PRICE INCREASE!



Write for your free sample today!

JIFFY MANUFACTURING COMPANY

360 FLORENCE AVENUE, HILLSIDE, N. J.

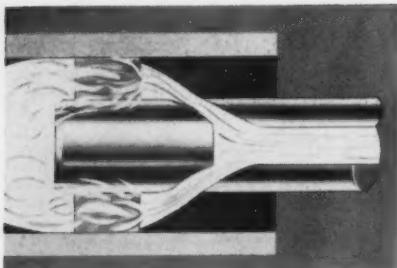


*Clupak, Inc.'s trademark for stretchable paper

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MODERN MACHINE SHOP 219

new equipment . . .



Polar Bar for boring and reaming cutters

LIQUID-COOLED BAR FOR BORING AND REAMING CUTTERS

A line of liquid-cooled bars, designed for adjustable boring and reaming cutters was recently announced by Muskegon Tool Industries, Inc., Eleventh at Western, Muskegon, Michigan. Designated Muskegon

Polar Bars, the toolholders feature built-in veins which deliver streams of coolant directly to each of the two cutting edges, flushing away chips and preventing heat build-up. Use of the bars is said to provide long tool life at high cutting speeds, as well as more accurate work.

Polar Bars are available with straight or Morse taper shanks in a full range of sizes for all Muskegon boring cutters and reamer blades, or for any other adjustable cutting tools of similar design.

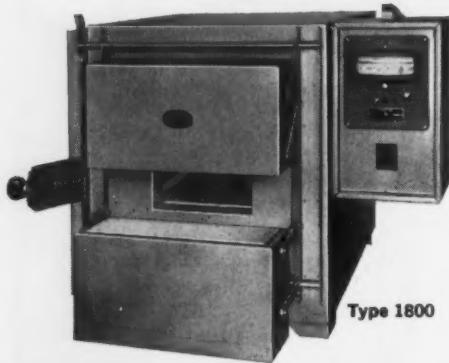
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★ modern machine shop ★

PRESSES FEATURE IMPROVED CYLINDRICAL TYPE RAM-WAY

To provide the extra rigid ram support required by carbide dies, the cylindrical type ram on Haver Hi-Production Automatic Presses has been improved, according to Sales Service Manufacturing Co., 2361 Uni-

the new BIG bench-type furnace for heavy production heat-treating



An all-new TEMCO electric furnace specifically designed to let you heat-treat more and bigger parts in a bench-type unit. Larger chamber size . . . 10" W, 9½" H, 22" D. Higher temperature range . . . continuous up to 2000° and 2300° F (1095° and 1260° C) . . . handles most high-speed steels.

This new Type 1800 TEMCO furnace features a close-sealing sectional door with patented lever suspension to provide limited or full access as desired. Reinforced welded steel case . . . 7½" firebrick and backup insulation. Choice of single or three-phase models, for 208, 230 or 460 volts. Available with or without controls. \$685 to \$745 furnace only.

Write for new TEMCO-THERMOLYNE literature and name of nearest dealer.



ELECTRIC FURNACES
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250 AMBITIOUS MEN
WHO WILL TAKE THIS TRAINING THIS YEAR?**



TOOL AND DIE DESIGN offers a high-pay career to qualified men willing to learn through Acme's famous correspondence training! Acme also offers Shop Math or Mech. Drawing courses.

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Creates Perfection"*

Comet. BORING TOOLS

(H. S. S. and Carbide) for Holes from 1/16" upward

Standard and Special Boring, Facing and Internal Threading Tools. Write for Data.

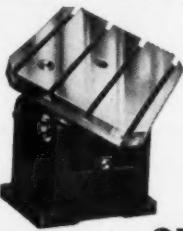
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COMET Tool Co.

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SAVE 50% of positioning time

With one set-up on a Cincinnati Gilbert universal table, you can drill at any angle up to 90° on 5 sides of a cube. Provides maximum support of work piece, assures rigidity and accuracy. Table sizes: 22" and 27" square, 22" high. For complete details and specs, ask for Bulletin 850.

Write for



Bulletin 850

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

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SERIES "AL"

These exceptionally accurate gages have the unique distinction of having a 1" or 2" travel.

Simple design and rugged construction assure outstanding accuracy & long life.

Shown - Model AL-13
Reading .001" - Grad. 0-100
Dia. 3" - Travel 2"

\$40.80

TUMICO DIAL INDICATORS

READING IN .001" or .0005"

Stainless steel stem and spindle. Choice of 6 graduations with either balanced or continuous dial. Unbreakable crystal. Adjustable bezel with clamp for locating zero. Two dial diameters available - 2 1/4" & 3" for 1" travel and 3" for 2" travel gages.

Jewelled bearings available on all models.



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TUMICO**

PRECISION MEASURING
TOOLS AND INSTRUMENTS

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SELF-CENTERING
BORE GAGES

Check bores for size, out-of-round and taper in any spot and to any depth within range of instrument to an absolutely reliable accuracy of

50 MILLIONTHS
of an inch

THIS HIGH PRECISION INSTRUMENT IS AN INEXPENSIVE, ACCURATE AND DEPENDABLE INTERNAL COMPARATOR

Small Bore Gages

RANGE .040" TO .140"	PRICE \$126.00
Complete in Hardwood Case	
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OTHER SIZES UP TO 10"	

MEASURING HEADS ARE HARDCHROME PLATED FOR MAXIMUM WEAR

GUARANTEED Mahr QUALITY

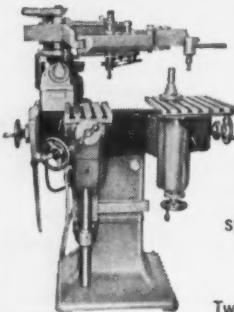
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MAHR GAGE CO., INC.
274-MO LAFAYETTE ST. • NEW YORK 12, N.Y.

HEADQUARTERS FOR PRECISION MEASURING INSTRUMENTS AND FINE TOOLS

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ALEXANDER die sinkers for 2 or 3 dimensional work



Latest model,
No. 3A for
molds and
dies up to
1000 lbs.
Ratios from
1.5:1 to 10:1,
14 spindle
speeds from 475
to 9500 rpm,
cutters up to
 $\frac{3}{8}$ " dia.
Two smaller sizes,
1A and 2A.

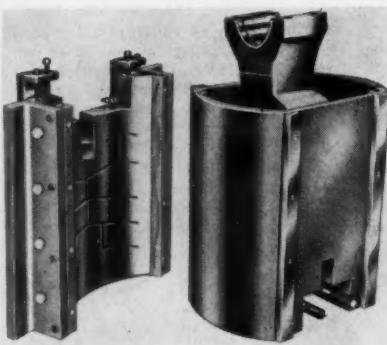
Write for Catalog C
on these quality, British machines.

J. ARTHUR DEAKIN, INC.
31 Roseland Ave. • Caldwell, N.J.

For more data circle 489 on Postpaid Card

222 MODERN MACHINE SHOP

new equipment . . .



Cylindrical Type Ram Way for Havar Press

versity Ave., St. Paul 14A, Minnesota. The improvement consists of the addition of flat bearing area at each side of the curved bearing at either end of the ram on all presses over 25 tons. (All Havar Presses 25 tons and under have full cylinder ram bearings.) In addition to adding bearing area, more complete support from every angle is provided for the ram. This added flat bearing consists of a bronze insert on the ram, that is easy to adjust for wear or to replace, and an adjustable steel gib on the bearing. This is said to provide greater resistance to deflection or "cocking" of progressive dies, where the maximum load is off-center.

For more data circle 100 on Postpaid Card

★ modern machine shop ★

LINE OF DETACHABLE MILLING MACHINE ARBORS AND ADAPTERS

The availability of an extensive line of detachable milling machine arbors and adapters with live bearing supports has been announced by J & S Tool Co., Inc., 871 Dorsa Ave., Living-

- PIERCING PUNCHES
- BUTTON DIES
- STANDARDS • SPECIALS

Also send Blue Prints for Estimates on
screw machine products and
centerless grinding.

PEMCO PERFORATORS CO.

DIVISION

PORTER MACHINE CO.
CINCINNATI 9 OHIO
30 YRS. SERVING INDUSTRY

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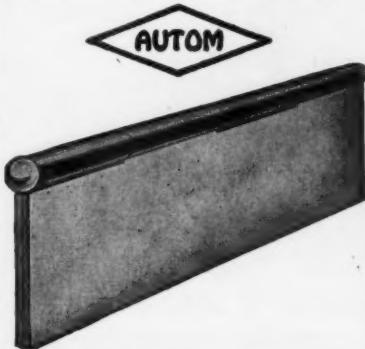
ABRASIVE CENT-R-LAP TOOL



Saves time, eliminates diamond dressing. Cones changed in seconds. Available in three sizes: $\frac{3}{8}$ ", $\frac{3}{4}$ " and $1\frac{1}{2}$ ". Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices. Sold to consumers only.

J. R. REICH MANUFACTURING CO.
201 E. Stroop Rd. Dayton 29, Ohio

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CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
& MFG. CO.**

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CHICAGO 19

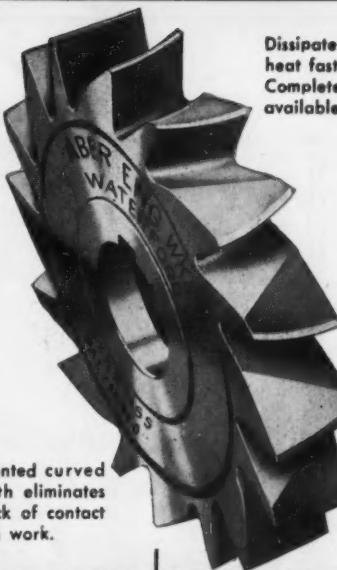
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February, 1960

Shearing Action

LONGER RUNS with

ABER Curved tooth CUTTERS



Dissipates
heat faster.
Complete line
available.

Patented curved
tooth eliminates
shock of contact
with work.

ABER Curved Tooth PLUS FEATURES

- Give More Accurate Control of Limits and Finish
- Elimination of Chatter and Breakage
- Extended Cutter Life
- Better Performance
- Increased Production

FREE DATA —
24 page catalog
on milling with
ABER Cutters.



ABER ENGINEERING WORKS

WATERFORD, WISCONSIN

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MODERN MACHINE SHOP 223

new equipment . . .

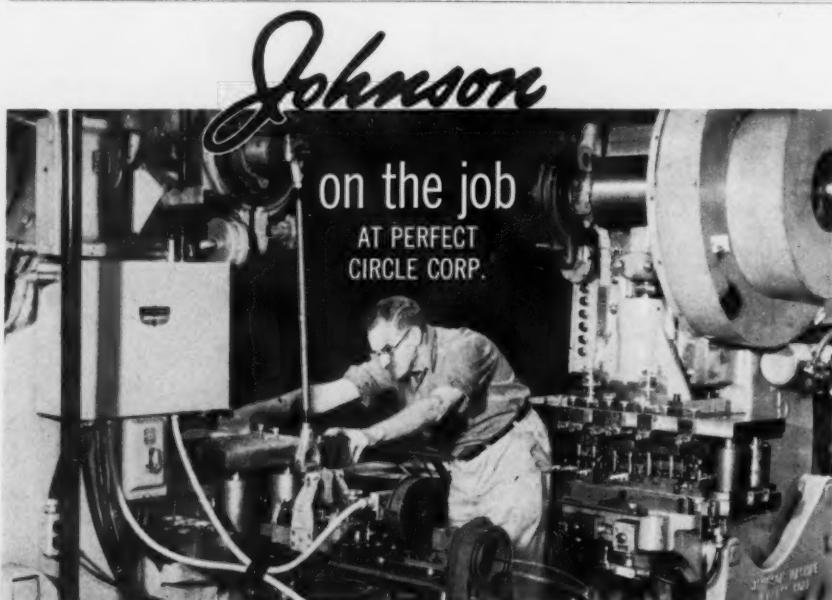
ston, New Jersey. All of the arbors and adapters in the new line, which is known as J & S "No-Bend," are hardened and ground to prevent set. Designed for quick change, the arbors are claimed to be interchangeable with 40 to 50 taper adapters, thereby permitting more continuous milling machine use and greater production.

Other features which the manufacturer claims for this line include full time tooth engagement, longer cutter life, lower cost and correct arbor lengths. **For more data circle 101 on Postpaid Card**

★ modern machine shop ★

OFFSET BORING HEAD

Flynn Mfg. Co., 18301 Weaver, Detroit 28, Mich., announces that its round contour offset boring heads are



From an interview at Perfect Circle Corporation: "The ability of our Johnson presses to do multiple operations simultaneously has resulted in an increased production of 20%."

Special presses built to order.

50 models of Johnson Presses

INCLINABLE • STRAIGHT SIDE • GAP • HORN



You will find the information you want on the complete Johnson line right at your fingertips in this easy-to-use catalog. Be sure to have your file copy on hand—*Write for Catalog 1960.*

JOHNSON MACHINE & PRESS CORP., 620 W. Indiana Ave., Elkhart, Ind.

For more data circle 494 on Postpaid Card



**DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD**

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

For more data circle 495 on Postpaid Card



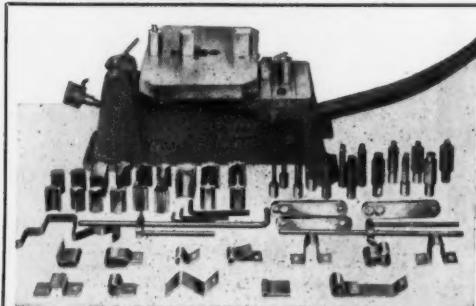
NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 days Free Trial. Several Territories Open for Distributors.

Write for Bulletin

BYCO INDUSTRIES
2200 Snelling Ave. Minneapolis 4, Minn.

For more data circle 496 on Postpaid Card



MultiformTM

BENDER CUTTER

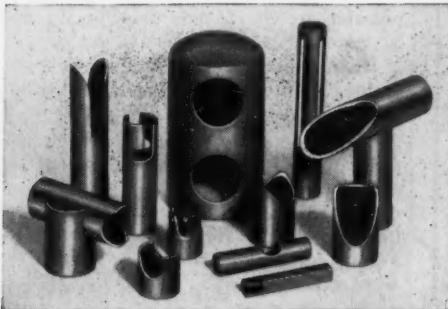
Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

**AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL**

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.

For more data circle 497 on Postpaid Card



Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . You can make them fast, some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

ARC-SNUG prepares pipe ends for snug brazing—up to 500 pieces per hour.

ARC-TWIN® double notches pipe up to 750 pieces per hour.

CUT-OFF shears tubing in two up to 2000 per hour.

VOGEL TOOL & DIE CORPORATION

1823 N. 32nd Ave., Stone Park, Ill.

For more data circle 498 on Postpaid Card

Ready NOW!



New CATALOG Of Precision Inspection Equipment

Write for new
Catalog No. 124



J. C. **BUSCH** CO.

Engineers & Machinists Since 1907
126 E. PITTSBURGH AVE. MILWAUKEE 4, WIS.

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BETTER TOOLS AUTOMATICALLY

Ground from Solids



Straight or Spiral

- Counter Bores
- Counter Sinks
- Taps
- Reamers
- Milling Cutters
- Special Tools from Carbides

No. 90 FM
Flute Miller

**Make Your Own Tools
Get Details Today!**

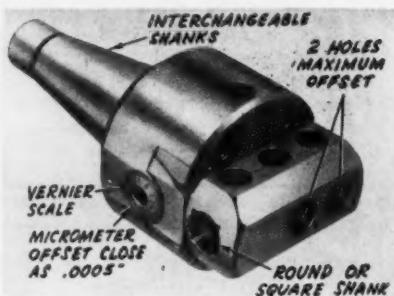
WARDWELL

3803 Ridge Rd. • Cleveland 9, Ohio

For more data circle 500 on Postpaid Card

226 MODERN MACHINE SHOP

new equipment . . .



Flynn Series 60 Offset Boring Head

now offered in another series, the "60", which features a long and stockier tool block for better securing the horizontal tool and permitting heavier cuts.

The horizontal hole is broached for holding both round and square tools. Two vertical mount holes are made possible by the longer tool block; one is centered in the block and the second is offset, thereby increasing the amount of overall offset that can be obtained.

Introduced with the 60 series is a vernier on the body which facilitates adjustment of the micrometer offset screw, making possible extremely close visual offset adjustment. This same feature is now included in Flynn 30 and 40 series heads.

Though standard with 20 pitch diameter offset screw, the 60 series introduces availability of 40 pitch diameter offset screw, permitting offset adjustment as close as 0.0005 inch per graduation on the screw dial. The company states that this same feature is also now available with 30 and 40 series Flynn heads.

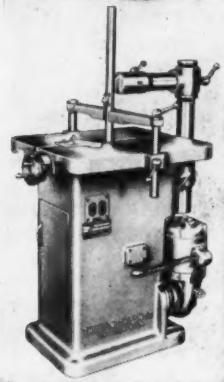
The new head is available in three sizes with nominal $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch bar capacities.

For more data circle 102 on Postpaid Card

February, 1960

This new MORRISON KEYSEATER can make money for you

Install it in your shop. Its low cost will amaze you. Watch it pay for itself. You can quickly eliminate costly production tie-ups caused by waiting for expensive outside services. This is not an ordinary keyseater. The Morrison Keyseater is quality built with machine tool accuracy. Practically anyone can operate it. It has automatic feed, automatic stop to cut off feed at given depths, automatic relief to back the work away from cutters, automatic centering, automatic lubrication. NO BUSHINGS REQUIRED. Cuts keyways 1/16" to 1". FREE new Catalog 714-A shows all features and specifications can be had by writing:



**THE D. C.
MORRISON CO.**

P.O. Box 1017-B
Cincinnati 1, Ohio

For more data circle 501 on Postpaid Card

**Chuck and Stub
REAMERS
IN DECIMAL SIZES
Why Buy Specials?**

Thousands by
the thousandths
IN STOCK

▼

IN EMERGENCY
Telephone
Libertyville
2-4200

SEND FOR CATALOG NOW!

**TWENTIETH CENTURY
MANUFACTURING CO.**
BOX 429-M LIBERTYVILLE, ILL.

For more data circle 502 on Postpaid Card

February, 1960

*Now Available...
FOR YOUR CONVENIENCE*

Miccro
Supreme Spray



**LAY-OUT DYE
(Purple)**

A new, easy-to-use, dependable, spray Lay-Out Dye for tool, die, pattern, or template layout on metal. Dries instantly—shows up in sharp relief.

Also Still Available...

Miccro
Supreme



**LAY-OUT AND
IDENTIFICATION
DYE (7 Colors)**

For layout on metal and quick identification of bar stock, sheets, strips, or parts. Also dries instantly and shows up in sharp relief. Available in brush-in-cap cans and larger containers.

*Write for circular on
company letterhead.*

**MICHIGAN CHROME &
CHEMICAL COMPANY**
8615 Grinnell Ave. • Detroit 13, Mich.

For more data circle 503 on Postpaid Card

MODERN MACHINE SHOP 227

new equipment . . .

THREAD ROLLING HEAD

Landis Machine Co., Waynesboro, Pa., announces that its No. 3½ Series Thread Rolling Heads are now manufactured in two styles, stationary and revolving to cover a UNC and UNF range from $\frac{1}{4}$ to $\frac{7}{16}$ inch.

Designed to withstand the rigors of continuous high production, the sta-

tionary head is adaptable to turret lathes, hand screw machines and automatic screw machines employing a stationary type head, while the revolving head is for application to automatic screw machines utilizing a revolving type tool. In addition, they can be applied to threading, drilling and tapping machines.

The 3½ Series Thread Rolling Heads feature replaceable helix angle bushings. By the use of a "mean" angle, one set of standard bushings is sufficient to roll all UNF and UNC threads with the range of the head. When an application necessitates an exact helix angle, the proper helix angle bushings can be substituted, eliminating the need for a special head.

With the ability to produce threads at high speeds without impairing roll life, other economical advantages provided include the fact that the rolls never require regrinding, allowing the heads to operate indefinitely without any adjustment.

REED
KNURLS
CIRCULAR and
DIAMETRAL PITCH

170
STYLES and SIZES
IN STOCK

For automatic screw machines and turret lathes. The lapped finish on the hard knurling surface contributes to outstanding performance and longer life.



We're constantly helping manufacturers solve their special knurling problems. Let us help with yours. Prices for special knurls quoted upon receipt of blueprints or detailed specifications.

SPECIAL KNURLS

Made to Order

WRITE FOR
KNURL BULLETIN

REED ROLLED THREAD DIE CO.

Specialists in Thread and Form Rolling Tools and Equipment

HOLDEN, MASSACHUSETTS, U.S.A.

K-163

For more data circle 504 on Postpaid Card



Thread Rolling Head

Hammond
OF KALAMAZOO

Model
"400"



HORIZONTAL
or VERTICAL

4"
ABRASIVE
BELT GRINDER

Eliminate costly hand filing, grinding and deburring. It soon pays for itself. Wet or dry models up to 10" available. Write for bulletin.

Hammond Machinery Builders

1615 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

For more data circle 505 on Postpaid Card



WOODRUFF KEYS



Our complete facilities enable us to furnish almost any size and description of Woodruff Key from a wide variety of materials. All ASME and SAE sizes plus many others are regularly manufactured and carried in stock in both C-1035 Carbon Steel and Heat Treated Alloy Steel. We can ship in bulk, popular assortments or in special assortments of your choice. For special needs, we will be happy to quote on request.

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS

PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 506 on Postpaid Card

February, 1960



KENTRALL Hardness Testers Are Motorized

By removing major test loads automatically, the new motorized Kentralls reduce operator error, increase reproducibility of test results, and raise the productive capacity of the machine—for the same price as hand operated testers.

The motorized Kentralls are available in Combination Testers which provide both Regular and Superficial Rockwell Hardness Testing in a single machine. For those applications that do not require the additional range, Kentrall also makes single purpose testers for either Regular or Superficial testing alone.

**For complete information write
for Bulletin CRS-60.**

KENTRALL

THE TORSION BALANCE COMPANY

Main Office and Factory:

CLIFTON, NEW JERSEY

Sales Offices: Chicago, San Francisco

TB-164 For more data circle 507 on Postpaid Card

MODERN MACHINE SHOP 229

new equipment . . .

ment after initial size has been established. Also, the thread rolls, which incorporate cage needle bearings for servicing ease, are designed to be reversed and both ends used.

Changes in diameter are accomplished by substituting the proper rolls for the diameter and pitch to be rolled. Minute plus or minus adjusting can

be quickly and easily done by loosening and tightening the opposed set screws in the adjusting ring.

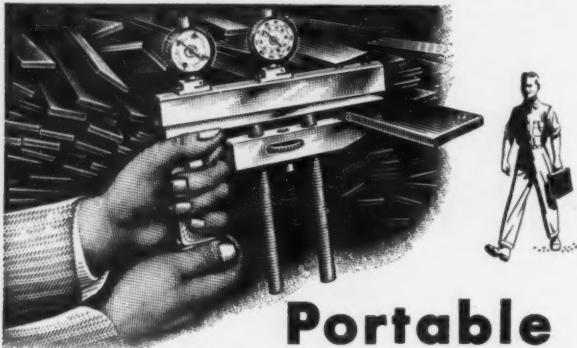
For more data circle 103 on Postpaid Card

★ modern machine shop ★

ADJUSTABLE ANGULAR TYPE DRILL HEAD

Multiple spindle drilling or tapping of holes at an angle is possible by using the universal joint type adjustable drill head with cartridge type spindle construction, announced by Thriftmaster Products Corporation, 1034A North Plum St., Lancaster, Pennsylvania.

The illustration shows how a Thriftmaster four spindle full ball bearing universal joint type adjustable drill head taps four holes each at a 4 degree angle with the vertical. The adjustable feature is a result of a special design



Portable Hardness Tester

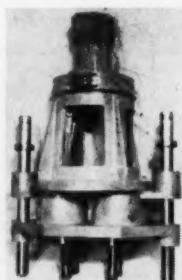
FOR ON-THE-JOB ROCKWELL READINGS

Extremely useful in making accurate hardness tests of warehoused stock or parts on the production line. Tester can be attached at any angle without affecting accuracy. No set-up time required . . . sectioning of specimens is eliminated. Fingertip loading up to 150 kg. Read Rockwell scale directly from large dials . . . no conversion necessary. Rockwell Scales A, B, C, D, E, F, G, H, and K available as standard. Weighs just 3 pounds 6 ounces.

For a demonstration, write Dept. MM-260.

Riehle® TESTING MACHINES
A DIVISION OF
American Machine and Metals, Inc.
EAST MOLINE, ILL.

For more data circle 508 on Postpaid Card



Angular Drill Head

KEO



COMBINED DRILLS and COUNTERSINKS

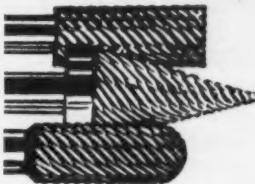
- Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes—both plain and bell type. Specials to your blue prints. We also stock Keyseat Cutters, Arbor Type Cutters, Center Reamers, Lathe Mandrels, T-Slot Cutters and Long Series Combined Drills.

KEO CUTTERS, INC.

25040 Easy St., Warren, Mich.
Warehouse: 1300 S. Soto St.,
Los Angeles 23, Cal.

For more data circle 509 on Postpaid Card

WRITE FOR FREE CATALOG



- ★ Ground Cut Rotary Files for Soft Metals.
- ★ Hand Chisel Cut for Hard Metals.
- ★ Carbide Rotary Files.
- ★ Salvage and Regrinding Service.
- ★ Dealers Inquiries Invited.

ROTA FILE
CORP.

1328 58th STREET • BROOKLYN 19, N. Y.

For more data circle 510 on Postpaid Card

People work better when they SEE BETTER®



AT CUTLER-HAMMER

a tool room worker uses the MAGNI-FOCUSER to read a Vernier Height Gauge

MAGNI-FOCUSER

S P E E D S P R O D U C T I O N
With Third Dimensional (3-D) Vision
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents. Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

Edroy Products Co.

For more data circle 511 on Postpaid Card

MODERN MACHINE SHOP 231

new equipment . . .

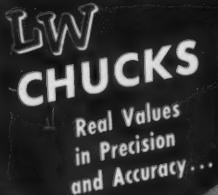
adaptation of the cartridge type spindle, which was developed recently.

The manufacturer states that the use of a different cartridge plate will permit minor changes of the center distance or of the angle of the spindles. For more data circle 104 on Postpaid Card

OFFSET BAR AND TUBE PRINTER

An offset bar and tube printer is being marketed by The Pannier Corp., 202 Sandusky St., Pittsburgh 12, Pa. Known as the "Economy" model, the printer complements the company's line of larger in-line production bar and tube printers, but its smaller size and mobility, when mounted on its portable stand, will also permit its use as a utility printer. This unit off-

set-prints bars and tubes of metal or plastic from $\frac{1}{4}$ to 11 inches o.d., without changing guide wheels, and operates at speeds up to 250 f.p.m., with a continuous message in characters from $\frac{1}{16}$ to $\frac{3}{4}$ inch high. It is especially well adapted for marking plastic tubing at extrusion speeds as low as 1 f.p.m. The printing wheel has a printing circumference of 12 inches and a face width of 1 inch. It uses



LW CHUCKS
Real Values
in Precision
and Accuracy...



MAGNETIC
GRIP WORK TIGHTLY
for Wet or Dry Grinding
Guaranteed waterproof.
Connections for either
110 or 220v. D.C.

WORKING SURFACE	
5 $\frac{1}{2}$ " x 13"	\$80.00
6 $\frac{1}{2}$ " x 18"	\$100.00
8" x 24"	\$213.50
10 $\frac{1}{2}$ " x 37"	\$375.00

DEMAGNETIZERS
Instantly demagnetize tools or production parts. No moving parts. 110 v., 60 cy. A.C.

PLATE TYPE

MODEL B-2
7 $\frac{1}{2}$ " x 12 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ "
Ship. wt. 55 lbs. \$78.00

MODEL J-1
7 $\frac{1}{2}$ " x 7 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ "
Ship. wt. 35 lbs. \$54.00



ROUND TYPE
3 $\frac{3}{4}$ " openings
\$27.50

RECTIFIERS A.C. input 110 volts; D.C. output 110 volts. P-1 for 5 $\frac{1}{2}$ " x 13" chuck 0.8 amps. \$57.50
P-3 for 6 $\frac{1}{2}$ " x 18" chuck 1.0 amps. \$68.75
P-5 for 8" x 24" and 10 $\frac{1}{2}$ " x 37" chuck 3.0 amps. \$87.50



DEMAGNETIZING SWITCHES For 5 $\frac{1}{2}$ " x 13" and 6 $\frac{1}{2}$ " x 18" sizes. \$15.00
Field discharge type for 8" x 24" and 10 $\frac{1}{2}$ " x 37". \$27.00

SEE YOUR DEALER OR
ORDER DIRECT, GIVING DEALER'S NAME



**ADJUSTO-QUICK
VISE**

LW

**CHUCK
COMPANY**

28 So. St. Clair St.
Toledo 4, Ohio

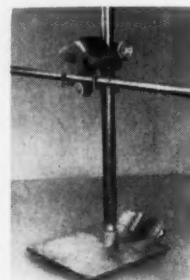


**DIVIDING
HEADS**



**MILLING MACHINE
VISES**

For more data circle 512 on Postpaid Card

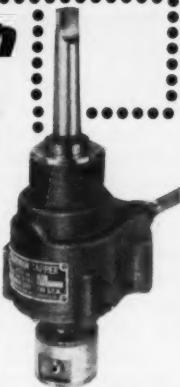


Bar and Tube Printer

Dorman Automatic Reverse TAPPERS

- Automatic Torque Control One minute to adjust Prevent tap breakage
- Easy to operate No skill required
- Wide Range of Tap Capacities No. 1A Friction Drive Tapper—capacity No. 2-56 to $\frac{3}{8}$ " in steel, $\frac{1}{2}$ " in aluminum. Also Positive Drive. No. 2B Positive Tapper—capacity $\frac{3}{8}$ " to $\frac{7}{8}$ " in steel.
- No. 3A Positive Tapper—capacity $\frac{1}{2}$ " to $1\frac{1}{4}$ " in steel.
- No. 4A Tapper—capacity $\frac{3}{8}$ " to 2" in steel including pipe taps.

Write for Bulletins
and information



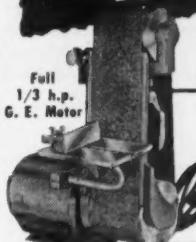
Immediate Delivery
Priced from **\$62.00**

Also Production
Threaders with Round
Split, Button or Acorn
Dies.

Thriftmaster PRODUCTS CORPORATION
a Subsidiary of Thomson Industries, Inc.
1034 N. PLUM • LANCASTER, PENNA.
Also Adjustable and Fixed Center Drillheads

For more data circle 513 on Postpaid Card

WALLS TU-WAY BELT SANDER



Full
1/3 h.p.
G. E. Motor

USE IT
EITHER WAY



HORIZONTAL

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features—yet sells for so little. **\$89.95**

complete—with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 514 on Postpaid Card

PRECISION CUTTING ... QUICK AND EASY

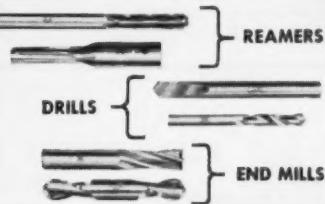
with **S&E**

SOLID
CARBIDE
TOOLS

S&E production cutting tools are ground from solid tungsten carbide to exact tolerances, concentric and with polished flutes.

These precision cutting tools are designed and built for one purpose: to cut fast, clean and easy; to hold size and form for extensive production runs; thus to yield lower cost tooling and higher production standards, and they do just that. Try S&E cutting tools—you will always be glad you did.

S&E are regularly fabricating special and unusual type cutting tools. Send drawings or request information — no obligation of course.



Complete
catalog of
S&E tools
available
on request.



S&E MACHINE
PRODUCTS INC.

Bridgeport, Michigan
Sales offices in all
principal cities.

For more data circle 515 on Postpaid Card

new equipment . . .

either a premolded rubber die or changeable rubber type. The number of characters or message cycles per revolutions depends upon size of type. **For more data circle 105 on Postpaid Card**

★ modern machine shop ★

METAL ETCHING CONTROL MATERIAL

Eastman Kodak Co., Graphic Reproduction Sales Division, Rochester

EVergreen 3-4835

CUTTER GRINDING SERVICE

END MILLS	SHELL MILLS
to $\frac{1}{2}$ " 60	to 2" 1.75
to 1" 90	to 3" 2.50

also Side Cutters, Slitting Saws, etc.
Send for Price List

JOSEPH KRYZ TOOL & CUTTER GRINDING SERVICE

P.O. Box 92
Brooklyn 22, N.Y.

175 Oaklnd St.
Brooklyn 22, N.Y.

For more data circle 516 on Postpaid Card

4, N. Y., has introduced a control material for metalworking industries which employ etching, photo milling or plating techniques.

Kodak Metal-Etch Resist was developed to assist in accurate and economical control of the removal of superfluous and hard-to-get-at metal from in-process pieces through etching or chemical milling. It is expected to have far-reaching applications in space-age industries which work largely with aluminum and titanium.

Kodak Metal-Etch Resist protects the surface of the in-process piece in those areas where the removal of metal is not required or is undesirable. The entire surface of the piece is first coated with Kodak Metal-Etch Resist. The piece is then exposed to high intensity light, from a carbon-arc or mercury-vapor lamp, through a photographically prepared line negative which "masks" the piece, passing the high intensity light to areas which require protection and excluding it from areas to be worked. This exposure forms an image of the desired

**GRIND: RADIUS — ANGLES — on your SURFACE GRINDER
ADAPTERS TO FIT YOUR CYLINDRICAL GRINDERS**

RADIUS DRESSER \$44.00

Diamond \$8.00



Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear.
Diamond always perfectly centered.
Easily set adjustable 180° stops.
All surfaces ground true from hole.
CAPACITY— $1\frac{1}{4}$ " convex to 4" concave.

10" Wheel size for DoALL and NORTON
Grinders—\$49.00. Diamond \$8.00.
14", 20", 24", in stock, low price.

ANGLE DRESSER \$49.00

Diamond \$8.00

ORDER DIRECT
on our 10 day
money back
guarantee



Ball Thrust Bearing.

24 Precision Ground Surfaces.

DIAMOND BLOCK Slides in Ground &
Lapped Housing.

Set Accurately with Protractor or Sine
Bar to 1" of Arc.
Largest Bearing Surfaces of any Angle
Dresser.

The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2199A E. 21st ST. • BROOKLYN 29, N.Y.

For more data circle 517 on Postpaid Card

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Write for bulletin 201 today.

CHUCK DIVISION
THOMAS HOIST CO.

28 S. HOYNE • CHICAGO 12, ILL.

For more data circle 519 on Postpaid Card



Hand lever closes
and locks while
lathe is running.



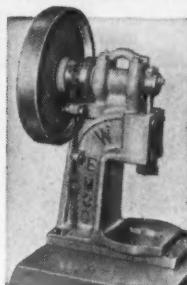
Jaws locked

EMCO

Power Punch Presses

**Emco W—
5 Tons**

**Emco X—
10 Tons**



For punching, forming, stenciling and riveting metal, rubber, leather, plastics. Up to 18000 operations per hour. Big-machine speed, strength, rigidity, accuracy, endurance. Compact, simple in design, fool-proof; quality construction. Thousands of Emco "W" and "X" presses illustrate Klaas reliability since 1921. Get Bulletin "M-2".

The KLAAS MACHINE & MFG. Co.

4334 East 49th Street Cleveland 25, Ohio

For more data circle 520 on Postpaid Card

COMMANDER TAPPERS



Lead Screw Tapper
Range: 0-80 to $\frac{1}{2}$ "-16



High Production,
Air Operated
Range: 0-80 to $\frac{1}{2}$ "-16



taps 2 to 15
holes at 1 stroke.
Adjustable
hole pattern



Pressure Sensitive Drive
Range: 0-80 to 10-24

105



Adjustable
Torque Control
Range: 0-80 to $\frac{1}{2}$ "-16

a Type and Size for Every Job!

Commander Tappers are made in 10 models—each designed to handle tapping jobs over a wide range. From the Commander Tapper line, you can select the right unit to give you the exact performance your job requires. Whichever Commander Tapper you select, you will get unequalled performance and tapping economy. Sold and serviced by drilling and tapping specialists. Write for the Commander Production Tool Catalog and name of nearest Distributor.



Commander MFG. CO. 4224 W. KINZIE STREET
CHICAGO 24, ILLINOIS

For more data circle 521 on Postpaid Card

February, 1960

MODERN MACHINE SHOP 235

new equipment . . .

pattern. After treatment with Kodak Metal-Etch Resist Developer, the protected areas will resist the action of the etching solutions.

Because it is a non-conducting material which adheres readily to a number of metals, Kodak Metal-Etch Resist is expected to be widely used

*To control your precision machines
making precision holes . . .*



COMTORPLUG

gives you an honest tenth,
eliminating guesswork gaging

Large, easily read tenths.
Fixed, not passing, reading.

Unique patented expanding plug gage gives automatic 2-point gaging, self-aligned, self-centered, with positive accuracy independent of operator variations. Reasonable cost lets you equip every operator producing precision bores. Thousands used in automotive, aircraft, household appliance, electric motor and other fast-moving programs to improve quality, increase production, keep down rejects.

For holes
 $\frac{1}{8}$ " to 10"
diameter.



SEND FOR BULLETIN 50 →
COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

COMTORPLUG

For more data circle 522 on Postpaid Card

also in plating in order to permit the plating of a piece in specific areas, while excluding the plating from other areas.

For more data circle 106 on Postpaid Card

★ modern machine shop ★

ALUMINUM "C" CLAMPS

Automatic Tool Products Co., 676 Elizabeth, N. J., announces aluminum alloy automatic "C" clamps with fast action and push-button control.

Just press the top button and the screw is automatically disengaged for rapid travel forward and backward. Release the button and the screw is engaged, ready for use. The clamp cannot be opened until tension on the screw is released by a turn of the handle. Buttress threading is said to assure positive locking control.



Aluminum C Clamps

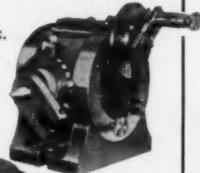
UNIVERSAL DIVIDING HEADS



• Precision built to meet every requirement, Carroll Dividing Heads are the accepted standard in metal-working plants from coast to coast. • A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.

Write for 8 page catalog giving complete details, etc.

Other Models 6" With or Without Direct Indexing.



10"-12" Universal Right or Left Hand Dividing Heads with or without Direct Indexing. Also with Spiral Drive.

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3525 Cordill Ave.

Cincinnati, Ohio

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The STEVENS Line SINCE 1925

Introducing NEW series



15" ROTARY TABLE—STD.

ROTARY TABLES 5-8-12-15-18-24"

sizes both standard and dial indexing types

ADJUSTABLE TILTING TABLES #0-1-2

COMPOUND TABLES #1-1/2-2

ROTARY-COMPOUND TABLES #1-1/2-2

INDEX CENTERS—multiple spindle

SPECIAL MACHINES—designed and built

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The John B. Stevens Company

Main Street, Somersville, Conn., U. S. A.

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ZIEGLER FLOATING TOOL HOLDERS

INCREASE TAPPING AND REAMING PRODUCTION

FAST SET-UPS — automatically compensates for misalignment up to $\frac{1}{16}$ " on dia. between machine spindle and work.

Free-Floating, Easy-To-Use Ziegler Tool Holders permit machine operators to maintain production without scrappage due to alignment inaccuracies, eliminate bell-mouthed and oversize holes and keep job set-up costs to barest minimum.

PROMPT DELIVERY

◀ SIZES and types to fit all machines used for tapping and reaming.



Hold positive hole location tolerances



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TODAY



W.M. ZIEGLER TOOL CO.
ROLLER DRIVE FLOATING TOOL HOLDERS

13562 Auburn
Detroit 23, Michigan

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new equipment . . .

Made of a strong aluminum alloy, the automatic "C" clamp combines light weight and durability.

Plated screws are available from the company for use in welding shops.

Sizes available include: 2, 3, 4, 6 and 8 inches.

For more data circle 107 on Postpaid Card

HIGH SPEED TAPPING TOOL

Armitie Laboratories, 6609 Broad St., Los Angeles 1, Calif., announces a Super Sensitive High Speed Tap-Tool, with a fingertip control head for precision tapping 0-80 to 4-40 holes in steel.

Control of the tapping operation is through the knurled collar, just above the tap. This control collar is held lightly in hand by the operator. A light downward pressure applied to the collar drives tap into the work

and a light upward pressure reverses it. During the tapping operation, the tap can be cleared as necessary by the rapid reverse control. The head is readily adaptable for through or bottom tapped holes.

Powered by a standard drill press, difficult jobs such as tapping 0-80 holes in steel are said to be simple

DEBURRING

—and many other secondary finishing jobs on metal and plastic parts—is handled faster, cheaper and better with
SCHAUER SPEED LATHES.

Write for Catalog 580.



Model shown equipped with collet. Also available with chuck.

SCHAUER
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CINCINNATI 42, O.

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The Armitie Tap-Tool



GUARANTEED to cut costs
PIN-MOUNT CORE DRILL

ALL NEW TWO-
PIECE CORE DRILL

DESIGNED FOR

Accurate Flute Alignment

Greater Flute Depth

Faster Chip Removal

Economy

Standards from $\frac{3}{4}$ " diameter in stock

Specials and carbide tipped cutters to order

Write for Illustrated Bulletin

METCUT

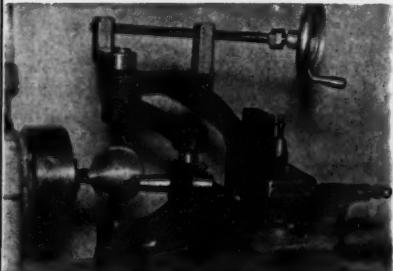
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METAL CUTTING TOOLS INC., Rockford, Illinois

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February, 1960

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Increase your production with fewer rejects and longer runs. Users report savings up to 81% over conventional lubricants.

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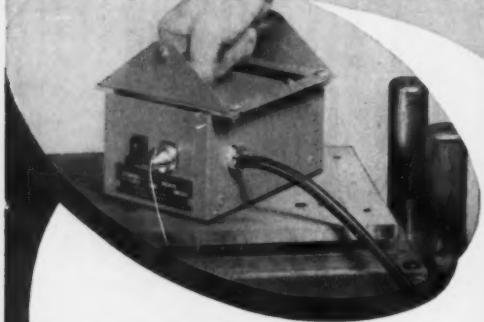
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MODERN MACHINE SHOP 239

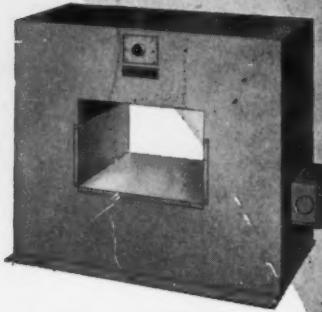
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A. C. DEMAGNETIZERS

Demagnetizing is essential to tool room and assembly work. A size and style for every application; guaranteed to do the job.



SURFACE TYPE for Continuous Duty. Work by Simple contact. Operate on any A. C. voltage. A size for every purpose.



LOOP THROUGH TYPE for continuous or intermittent duty.

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new equipment . . .

operations with this head, and can be performed easily at the rate of 10 holes per minute.

For more data circle 108 on Postpaid Card

★ modern machine shop ★

LINE OF ROTARY TABLES IS EXPANDED

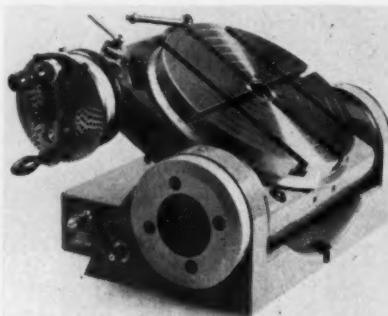
Karl A. Neise, Dept. MT-16, 404 Fourth Ave., New York 16, N. Y., announces the addition of new Walter Rotary, Tilting-Rotary and Horizontal-Vertical models to this line of dividing equipment.

The Walter Tilting-Rotary Tables are available in five sizes, ranging from 10 to 25 inch diameters. There are two series from which to choose: the Standard Series (see illustration), accurate to 30 seconds, and the Super Accurate Series, accurate to 10 sec-

onds. Super Accurate Series models, accurate to 5 seconds, are available.

Vernier readings of the two series are 6 and 2 seconds, respectively. Tilting angles on all models can be read to one minute.

The Super Accurate Series owes its unusual precision to many features,



Standard Walter Tilting-Rotary Table

among them are hardened, precision worm gears; the constant immersion of all gears in oil; positive locking devices on all movements; and correcting mechanisms.

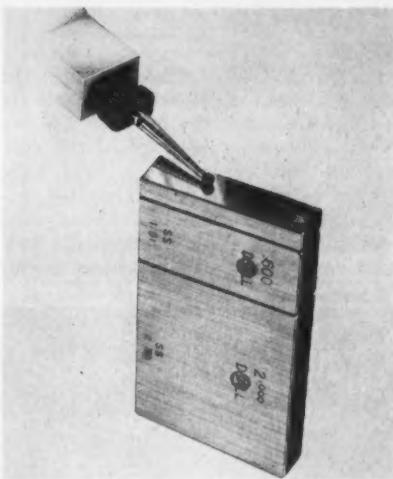
The company states that the universality of the Walter Table is now complete, since any combination of indirect, degree and/or direct indexing may now be achieved on one table. For more data circle 109 on Postpaid Card

★ modern machine shop ★

STAINLESS STEEL GAGE BLOCKS

Stainless steel gage blocks, offering industry greater continued accuracy and much longer life, have been developed by The DoAll Co., Des Plaines, Illinois.

These stainless steel gage blocks have a tough, but unhardened, core which is claimed to be inherently stable and, therefore, provides a firm foundation for the hard outer case.



DoAll Stainless Steel Gage Blocks

The new blocks are expected to increase shop use of gage blocks tre-

and MAGNETIC FIELD INSTRUMENTS

RESIDUMETER

A highly sensitive instrument, designed to determine and register magnetic fields in any work piece. Effective on all types of metals — bearings, races, plug gauges or any metal piece that may have become magnetized



MAGNETIC FIELD INDICATOR

An instrument to indicate residual magnetism in any piece below a negligible degree. Operates by simple contact . . . no electric.



Manufacturers of:

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NEUTROLATOR

NEUTROFIER

ELECTRO-MATIC

2231 North Knox Avenue

PRODUCTS CO.

Chicago 39, Illinois, U.S.A.

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new equipment...

mendously. Use of gage blocks in the shop has been considered desirable for a long time, but the practice has not been widespread because of the care needed to keep regular steel gage blocks in satisfactory condition.

Inasmuch as the stainless steel blocks require no more than the normal care given any precision gaging

equipment, their rapid adoption for shop use is predicted. As a consequence, tools and machine stops will be set directly by gage blocks, eliminating slow and costly setups by cut-and-measure techniques. Machine and production inspection will be done with gage blocks, eliminating one or more intermediate gage setting steps. Since each instrument must be ten times more accurate than the one it checks, this will be a practical method for holding tolerances now commonly required in production. Inspection on surface plates will be expedited, because setups will not have to be disassembled after each day's work. For more data circle 110 on Postpaid Card

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★ m m s ★

CUSTOM-BUILT MOTORS

A line of precision, custom-built motors in NEMA frame sizes is introduced by Pope Machinery Corp., 261 River St., Haverhill, Mass. Designed for applications where a precision drive is a necessity, these motors are dynamically balanced to 0.000025 amplitude of vibration. Maximum shaft runout is 0.000050 inch. Pope Precision Motors are avail-

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TOOL
COSTS

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made like new again
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Twisted or broken tangs replaced at low
costs on any tool with a Morse Taper (sizes 1 to 4)
Hundreds of leading industries save money on drills,
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Prompt delivery. Send for prices—or send tools for repair.
All work guaranteed.

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NO SHORTENING! NO DISTORTION!
GUARANTEED STRONG AS NEW!

Send them to us like this!

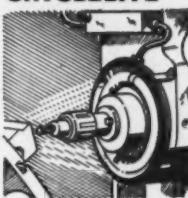
• Patent No.
2,542,044

NU-TANGS INC. 1339 Bates Avenue
Cincinnati 25, Ohio

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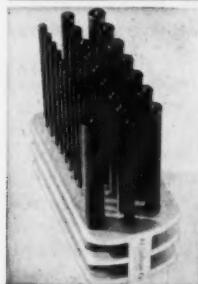
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fluorescent fixtures direct
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shadows, ob-
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SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled

and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes $\frac{3}{32}$ " to $\frac{1}{2}$ ", by
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Matthews Amazing Airgrit will safely
mark the hardest of polished surfaces,
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A gentle blast of fine etching abrasive
through a rubber mask permanently
marks the part with no damage, stress,
fracture, or distortion.

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the full line of these units.



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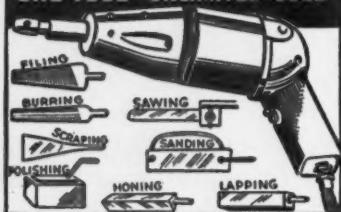


new equipment . . .

able in 1 to 20 h.p. with speeds from 900 to 3,600 r.p.m., and with straight or tapered noses. Permanently preloaded double row cylindrical roller bearings with tapered bores are mounted at the shaft extension end of the one-piece integral casting, that forms

STOP . . . HAND WORK

ONE TOOL - UNLIMITED USES



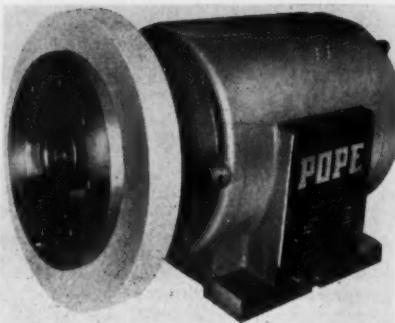
Use these Handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are $\frac{1}{8}$ " or $\frac{1}{4}$ " long. Operate on 110 Volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute. Try one of these tools on your next job.

Send for Descriptive Literature.

ACME TOOL CORP.

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Pope Precision, Custom-Built Motor

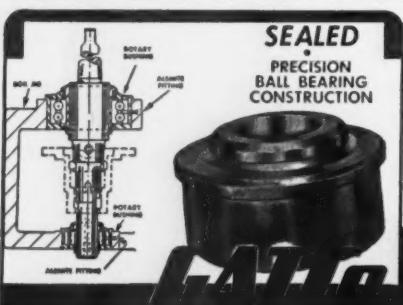
the motor housing the base. The rear housing for the bearings locates permanently preloaded, angular contact bearings close to the rotor. This housing and extra large shaft and bearings provide the extreme rigidity required for a super-precision motor.

The motor in the illustration shows a precision grinding application, with a Pope balancing type wheel holder. Provision has been made in the base for the mounting of a wheel guard. For more data circle 111 on Postpaid Card

★ modern machine shop ★

DOUBLE HANDLE TORQUE WRENCH WITH 0 TO 100-INCH POUNDS RANGE

Apco Mossberg Co., 1010 Lamb St., Attleboro, Mass., announces a versa-



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FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING

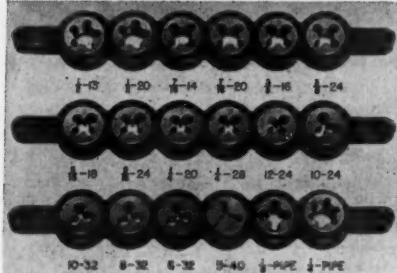
The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work - or both. Eliminates expensive tool construction - Reduces tool wear - Prevents seizure and pilot breakage - Especially adapted where precision is required.

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ROTARY BUSHINGS

42336 ANN ARBOR ROAD PLYMOUTH, MICH.
Telephone GLenview 3-2295

THREADING TOOL



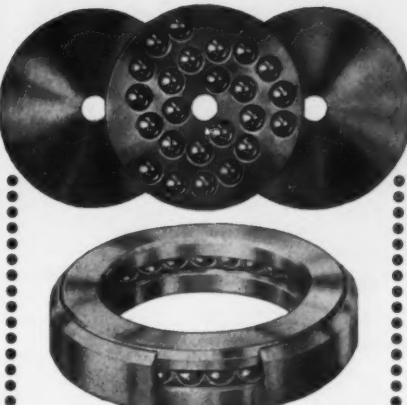
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1-SET "MOHR
THREADING TOOLS" ... **\$39.00**

Three precision holders, of high strength aluminum, with 18 high grade adjustable dies. Sizes as shown above. All orders sent on 10 day approval basis.

MOHR TOOL & MFG. CO.
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THE GWILLIAM COMPANY

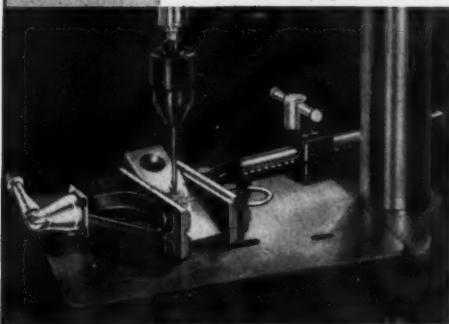
INCORPORATED 1912

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AUTOMATIC KEYLESS CHUCK

Lets you change tools *in seconds* without stopping the spindle. One chuck does the work of several spindles, won't chew up tool shanks. The greater the torque, the tighter the grip.

DRILL PRESS VISE

Floats and locks *instantly*, positively, in any position on table. Holds work safely for accurate drilling and tapping. Two models: 9" and 12" capacities.

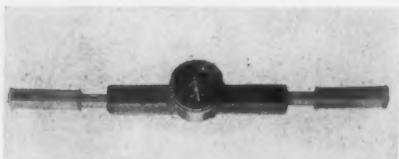
Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N. J.



WAHLSTROM® / FLOAT-LOCK®
AUTOMATIC CHUCKS SAFETY VISES

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new equipment . . .



Apco Mossberg Double Handle Torque Wrench

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SPECIALISTS IN PREARED TOOL STEELS

LEADERSHIP, like reputation, is earned by striving for perfection and by the consistent delivery of quality-controlled products. "He profits most who serves best".

LEADERSHIP is often copied—but never equaled! Marshall Steel Company makes available the largest stocks of Ground Flat Tool Steel on the market in three types:

OILCrat: A fine grained electric furnace tool steel, oil hardening (S.A.E. O-1 Tungsten Type) Analysis.

AIRCrat: A 5% chromium fine grained electric furnace tool steel, air hardening. This is (S.A.E. type A-2) Analysis.

MARSHALLCrat: Low Carbon, silicon killed 1018, high-quality carbon steel. (Can be case-hardened or carburized)

Each of these 3 grades are metallurgically correct for proper heat treating... truly... The ARISTOCRATS OF GROUND FLAT STOCK.

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tile double handle torque wrench for one-man tightening in the automotive, assembly and electrical fields and for general industry. The tool is excellent for use in confined spaces, as less than $\frac{3}{4}$ inch rotary travel gives a total torque range of 100 inch-pounds.

A dial indicator type torque tool, the Model TDF-100 torques both left and right. The torque bar is made of alloy steel, which will retain its setting despite rough usage. Indicator housing and handles are of lightweight aluminum. Overall length of the tool is 20 inches and weight is 3 pounds.

The dial indicator is large and easy to read, $2\frac{1}{2}$ inch o.d., and has clearly defined white graduations. Dial range is plus and minus 0 to 100 foot-pounds with minimum graduation equal to 5 foot-pounds. A $\frac{1}{4}$ inch square drive with spring ball lock will fit all of the standard wrench attachments.

A larger size torque tool, the Model TDF-600 designed for heavy duty torquing, is also available from the company. This has a range of plus and minus 0 to 600 foot-pounds.

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- Layout Plates • Angle Plates
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Lawley Surface Plates are made of hand-lapped black granite from 4" x 6" x 1" to 8" x 20". Accuracies to .00005".

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Model

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America's
largest selection of
economically priced
PRESS ROOM
EQUIPMENT

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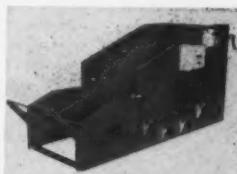
TOOL COMPANY

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Our nearby
representatives will
be pleased to be
of service to you
without
obligation.

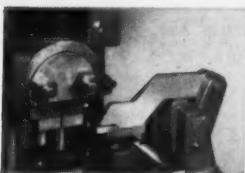


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\$135.



COIL CRADLES, 40 Models
from \$285.

Write for new, free catalog detailing a complete
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PERS, 5 Models from \$69..



TOOL and DIESMAKER'S
PUNCH HOLDERS, only \$19.50

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MODERN MACHINE SHOP 247

new equipment . . .

MOLYBDENUM DISULFIDE LUBRICANT

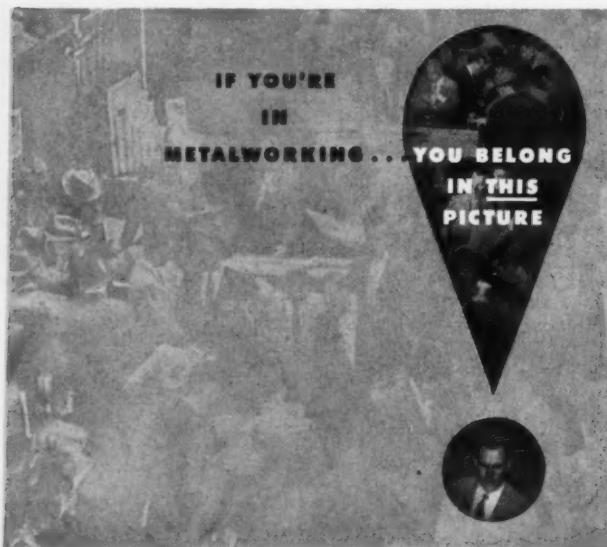
A molybdenum disulfide lubricant, Molykote M-55-Plus, for extreme pressure applications—on drills, taps, cold metal forming dies, punches and such—is announced by Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn. It supersedes M-55, the 5 percent EP dispersion in medium oil.

Molykote M-55-Plus does not derive its extreme pressure characteristics from the fusion of additives like sulfur and chlorine at elevated temperatures. It is, thus, suitable for slow moving parts under heavy loads and for surfaces which would be reactive with additives.

The improved lubricity of M-55-Plus and its ability to "plate itself out" on metal surfaces, recommends it also for important wear reduction applications in sleeve bearings and instrument gears, even though lightly loaded.

A colloidal dispersion of sub-micron particles in mineral oil, M-55-Plus has been approved for use in mist type lubricators. In fact, its stability recommends it as an additive in drawing oils, tapping compounds, gear oils and petroleum - base hydraulic fluids. The MoS_2 particles show no tendency to settle out after extended periods. Stability tests at different dilutions in a variety of vehicles have been run at 140 F. for several months with no settling.

Physical specifications are: viscosity (ASTM D88-44) 530 SUS at 100 F. and 57 SUS at 210 F.; flash point and



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fire point (ASTM D92-52) 340 and 390 F. respectively; specific weight, 7.9 lb/gal; Shell four-ball welding load, 520 kg; mean Hertz load, 72; recommended dilution, 9 to 1; and service temperature range, 0 to 250 F. For more data circle 113 on Postpaid Card

* modern machine shop *

LINE OF FILES IS EXPANDED

The addition of American pattern and milled curved tooth files to its Star brand line of quality metal cutting tools is announced by Clemson Bros., Inc., Middletown, New York.

Both files, which are produced by the most modern production methods and machinery, bear copper tangs for easy identification.

Each Star File is precision cut, scientifically heat treated and individually checked and tested. Clemson officials claim the manufacturing care expended has resulted in a quality file which is said to remove more metal with less effort and which wears better and stays sharp longer.

American pattern files are used for all shop practice, lathe filing

and for sharpening mill and circular saws. There are files for cleaning rough castings and cutting hard metals. Other files in this pattern are available for cutting soft materials such as lead, babbitt, aluminum, brass and wood.

Milled curved tooth files are designed for auto body manufacture and repair and for use in garages, machine shops, aircraft factories and so on. Each circular cutting edge is actually a miniature milling cutter. The definite undercut, or rake, allows each

Most Important Event in METALWORKING 1960 ASTE TOOL SHOW and CONFERENCE

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There'll be plant tours, too . . . a chance to see and study, in actual operation, product and process methods in the world's major center of high-volume production.

All of these scientific and educational attractions, and more, will bring more than 35,000 metalworking management, engineering and production men to the 1960 ASTE TOOL SHOW. Make sure you're one of them! Write or wire immediately for your rapid registration forms.

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new equipment...

tooth to take a sizable bite out of the work and to clear itself of chips.
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Mitchell-Bradford Chemical Co.,
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Expedite Mold-Making with CERRO* ALLOYS

Low-temperature-melting CERRO ALLOYS are excellent for rapid, accurate, inexpensive production of molds. A typical example is the Polyethylene bottle mold of which one-half is shown above. Patterns, secured to a metal plate, are sprayed with molten CERRO ALLOY to a depth of 1/16", then removed and incorporated in a chase. A copper tube for rapid water cooling is included in the mold. Thousands of bottles were produced from this mold. For detailed information send for Bulletin G2, and the new CERRO ALLOY "HOW TO" applications booklet.



CERRO DE PASCO SALES CORPORATION

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*T.M. Cerro de Pasco Corporation

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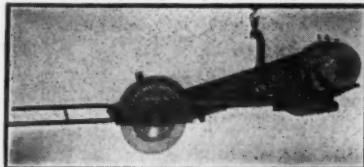
nounces three rust preventive products. Composition 15 for cast and malleable irons, sintered metals and steel, and Composition DR and Composition DS specifically for steel.

Composition 15 is a new rust preventive liquid to be added to either hot or cold water rinses to prevent rusting of cast and malleable irons, sintered metals and steel during processing. It is especially adapted to porous metals which, in most cases, will rust immediately after rinsing, especially after pickling operations. Because there is no residue left on the surface of the metal, organic coatings can be applied to the surface without any further treatment or without any detrimental effect on the adhesion of the coating. Composition 15 is used from one to four fluid ounces per gallon of water.

Composition DR is a new rust preventive to be added to hot or cold

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Sizes 12", 14", 16", 18", 20" and 24" wheels



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TROYKE

ROTARY TABLES

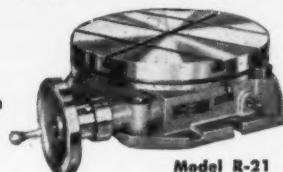
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Greater Rigidity

6 Sizes • 8 Models

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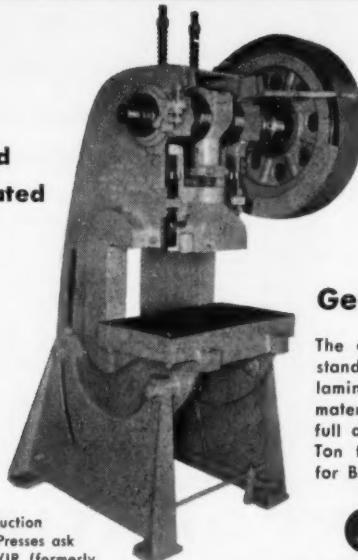
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Automatic Presses ask
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**Extra bed area
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PRESS-RITE
40 TON

Generous Die Space

The extra bed area (up to $\frac{1}{3}$ more than usual standard 40 Ton Presses) makes this press ideal for laminations, electronics, die trimming, non-metallic materials in addition to regular production. For full details on this and all PRESS-RITE Presses, 2 Ton to 85 Ton, ask your PRESS-RITE Distributor for Bulletin 958 or write.

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new equipment . . .

water rinses to facilitate drying and add corrosion resistance to the steel surface. This product will give extended corrosion resistance. It is also designed to be used in tumbling barrel rinses to facilitate drying, eliminate staining and add corrosion resistance to the steel surfaces.

For more data circle 115 on Postpaid Card

TUBE PIERCING UNIT

A tube piercing unit is announced by Tool Products Corp., 377 Old Falls Blvd., North Tonawanda, New York. Features of this self-contained unit are its ability to perforate one hole only or two opposed holes with one stroke of the press. The holes need not be the same diameter nor configuration and no mandrel is required. Distortion is held to a minimum by

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3 point
Centralization

NEW ALINA DIAL COMPARATOR SET NO. 99

The 3 purpose instrument with unlimited application in your inspection department

Use as Dial Indicator graduated to read in .0001".

Use as Bore Gage covering a range of .200" thru
.5.090" and reading in .0001".

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The No. 99 incorporates a high quality dial indicator together with all the necessary gage heads and extensions. It may be used directly at your machines or clamped to your fixtures. Furnished in handsome plush-lined case.

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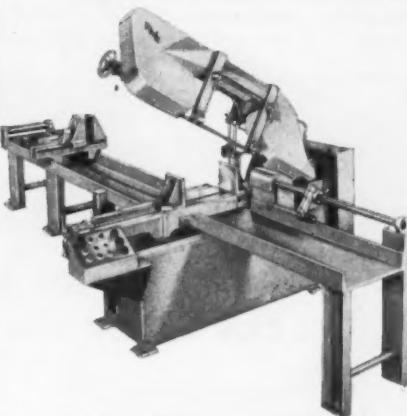
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For more data circle 556 on Postpaid Card

February, 1960

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Only Peerless has these big advantages:

- Counterbalanced saw frame
- Automatic feed pressure control
- Compensating feed unit which automatically regulates blade pressure
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RACINE, WISCONSIN

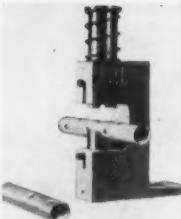
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MODERN MACHINE SHOP 253

new equipment...

the complete enclosure of the tubing during the perforating operation.

Multiple punching of a tube can be achieved by arranging any number of these units in a press or press brake. The perforating is accomplished by laying the piece of tubing in the matching configuration in the lower portion of the unit or units, if they



Tube Piercing Unit

are set up in multiple. When the press is actuated, the ram descends and moves the upper half of the floating guide downward until it encases the tubing. As the ram continues its stroke, the punches advance and perform the perforation of both top and bottom of the tubing. For more data circle 116 on Postpaid Card

★ m m s ★

CRYSTAL SLICER

W. H. Nichols Company has developed a compact automatic precision crystal slicing machine that combines a variable feed downward plunge cut with a synchronized automatic increment cross feed.

It is claimed that plunge cutting offers the shortest feed stroke, with substantial savings of time due to the slow feeds required for precision wafering of germanium, silicon, quartz and similar materials. The downward

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NEW WAY OF STAMPING **HEX PLUGS**
or around
circumference of
SLEEVES



As handle is turned, gear arrangement moves roller die across part being marked. Fixture uses cradle for sleeves and special table for hexes. Write for Bulletin 646.



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MARKING FIXTURE**

A product of the Marking Device Industry

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FLAT TWISTED
HIGH SPEED DRILLS**

. . . the only drill of its kind on the market! Choice of Industry for 56 years for large diameter and deep hole drilling where greater clearance is of utmost importance . . . requires fewer withdrawals for chip clearing! Available only in $\frac{1}{2}$ " and larger; taper shank and straight taper length. FREE TRIAL OFFER—state size.

• Also Rolled Section and Special Drills as well as Milled type Drills.

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FLEETWOOD, PENNA.

For more data circle 560 on Postpaid Card

February, 1960

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INSTANTLY Adjustable
SOFT, COMFORTABLE LIGHT



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180°

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No bolts or screws to loosen, then reset. Vimco-lights adjust easily . . . stay firmly in place. Comfortable light, never over-intense . . . never under-intense, prevents eye strain and rejects. Send for bulletin.



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Since 1919
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MODERN MACHINE SHOP 255

new equipment . . .

plunge cut, by means of the automatically-cycle rise and fall spindle head, brings the diamond-charged slicing blade to the work, permitting the crystal boule to be rigidly mounted and supported during the cutting operation.

This machine is one of several models developed to meet specific

demands. It features Bijur mist-lubricated high speed spindle construction for 10,000 or more r.p.m., driven by balanced flat belt pulleys and 2 h.p. reversing motor. Rigid cutter arbors are fitted with special wheel flanges that fling coolant to the periphery of the slicing blade and into the cut. The ball bearing arbor support is also mist-lubricated. Exposed metal surfaces are Parko-lubrited to resist rusting. Provision is available to take slicing blades from 4 inches in diameter or less up to 12 inches in diameter to suit varying sizes of parts to be sliced. An automatic adjustable timer controls automatic lubrication system for the slicing members of the machine. The automatic increment cross feed is a pneumatically controlled picker-feed adjustable from 0 to 0.085 inch in steps of 0.001 inch with repeat accuracy guaranteed plus or minus 0.00025 inch per increment. Maximum travel is 6 inches.

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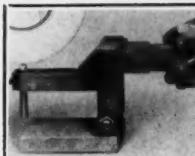


All tool steel Rockwell C 58/60 — honed finish, no pickup — heads left soft and are guaranteed uniform. Attractively priced at \$12. to \$19. per C. We manufacture 103 and stock 103 sizes for immediate delivery.

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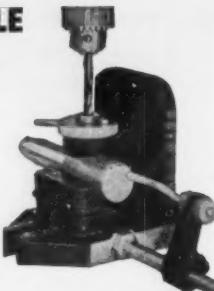
**NEISE
MODERN TOOLS**



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ADJUSTABLE DRILL JIG

- eliminates layout
- cuts drilling time



Used for drilling holes through round stock and hex stock from $\frac{1}{4}$ " to 2" and cap screws from $\frac{1}{4}$ " to $1\frac{1}{2}$ ", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. • Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operations that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. • The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for $\frac{1}{4}$ " to $21/32$ " diameter, one for $21/32$ " to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. • Jig highly successful in permitting use of inexperienced drill operators. For circular write to: Mathewson Machine Works, 40 Hancock St., Quincy 71, Mass.

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finest quality, heat-treated high speed steel—hard and tough!

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constant spiral at all degrees of taper; polished hollow ground flutes; double back off; shanks ground to fit standard spring collets and set screw type holders.

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fast, clean cutting without rubbing; minimum heat, longer life; may be resharpened 4 or 5 times at approximately 20% of new tool cost if desired.

Several territories open for distributors.

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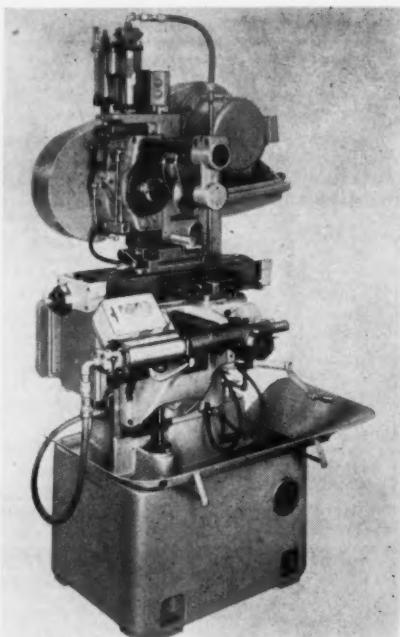
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1066 Butterworth St. • Grand Rapids, Mich.

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258 MODERN MACHINE SHOP

new equipment . . .



The Nichols Crystal Slicing Machine

not lend itself to plunge cutting, the machine may be equipped with automatic variable table feed, synchronized with the rise and fall and cross feed motions. This machine is available

Buy safe "SHUR-GRIP"



drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes re-molding easier, quicker, surer, less expensive.

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February, 1960

from Robert E. Morris Co., REM Sales Division, 5004 Farmington Ave., West Hartford 7, Connecticut.

For more data circle 117 on Postpaid Card

★ modern machine shop ★

CARBIDE IMPREGNATOR INCREASES TOOL LIFE

A portable, electrically operated carbide impregnator substantially increases the effective life and usefulness of high speed steel cutting tools, according to The O. K. Tool Co., Inc., 800 Elm St., Milford, New Hampshire.

The Wickman Impregnator, which plugs into any 110 volt outlet or can be furnished for 220 volts, requires no special skill or training to operate. It is furnished with three interchangeable carbide electrode tips for use depending upon the size, shape and general function of the tool to be treated. The time required for carbide impregnation, which is confined to areas of the tool subject to abrasive wear, varies from about 3 minutes per square inch on "coarse" treatment to 5½ minutes per square inch on "fine." The "coarse" range produces a



The Wickman Portable Carbide Impregnator

February, 1960

rougher surface, suitable for work-pieces of coarser application, such as conveyor parts, work hooks, scraper blades and shovels, where increased resistance to abrasive wear is desired. The "fine" range is generally used for cutting tools of all types.

The carbide is not merely deposited on the work surface, but penetrates

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Refer to Sweet's Machine Tool File or Hitchcock's Machine Tool Encyclopedia, 1959 editions, for our catalog.

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SPEEDMILLER for Planer Conversions**
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you promised you'd give them
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Why put off a good move? Call your Industrial Distributor or have one of our abrasive Engineers arrange a trial run of Jewel Brand Abrasive Belts today.



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South Braintree 85, Massachusetts

Please send more information about cost-cutting Jewel Brand Abrasive Belts!

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Title.....

Company.....

Address.....

City..... State.....

For more data circle 571 on Postpaid Card

260 MODERN MACHINE SHOP

new equipment...

the parent metal and builds up on it. The thickness of the carbide layer, which is said to not be susceptible to peeling off in service, is in the order of 0.003 inch on the "coarse" setting and 0.0005 inch on the "fine" setting of the machine.

For more data circle 118 on Postpaid Card

★ modern machine shop ★

7½ INCH DEEP BENCH AND PIPE VISE

Designed for use by oil field machinists, pipe fitters and in general manufacturing where high throat depth is required, a combination bench and pipe vise with a throat depth of 7½ inches is introduced by the Wilton Tool Mfg. Co., Inc., Dept. MMS-109, Schiller Park, Illinois.

The rugged, extra heavy duty vise, with a 6 inch jaw width, 6 inch pipe holding capacity and 10 inch opening, weighs approximately 160 pounds. The same type of vise is also available in 3½, 4½ and 5 inch jaw width size.

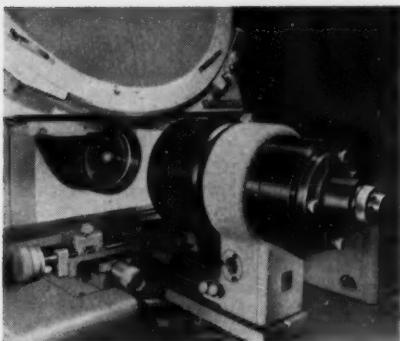
The pipe jaws are hogged out of solid rectangular bars of tool steel, heat treated to a hardness of 56 Rockwell C. The top jaws have heavy duty diamond serrations with 9 square inches work holding surface on each jaw.

For more data circle 119 on Postpaid Card



Wilton 7½ Inch Deep Bench and Pipe Vise

February, 1960



Lens System for J & L Optical Comparator

6 INCH LENS SYSTEM FOR OPTICAL COMPARATOR

Jones & Lamson Machine Co., Optical Comparator Division, 521 Clinton St., Springfield, Vt., announces a new five magnifications lens system with a 6 inch aperture, free from measurable distortion.

This J & L lens is especially useful in applications which require the precise measurement of large areas. It permits great latitude of use, due to its extremely sharp definition and freedom from distortion. It is easily installed in all Jones & Lamson Comparators that are equipped for five magnifications.

For more data circle 120 on Postpaid Card

★ modern machine shop ★

ABRASIVE CUT-OFF MACHINE

A. P. deSanno and Son, Inc., Phoenixville, Pa., announces the Radiac Type "JOAH" Wet Cutting Abrasive Cut-Off Machine for fast, accurate cutting of solids up to 4 inches, round or square.

Features include: clean, smooth cuts for metallurgical cutting and finish cuts with practically no burr; easy material handling of heavy bars with the new Radiac feed; readily accessible



"Just between you and me,
they've got it all over the
other ones we've tried!"

While there are other excellent brands, experienced operators consistently rate Jewel Brand Abrasive Belts best for grinding, smoothing and polishing. Worth trying! Order thru your Industrial Distributor today.



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ENCO Self-Indexing HEXTURRET

Convert your lathes for turret work this quick, easy way. ENCO HEX-TURRET gives you the accuracy, rigidity and speed you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

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Please send catalog #53 and full details of
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For more data circle 573 on Postpaid Card

262 MODERN MACHINE SHOP

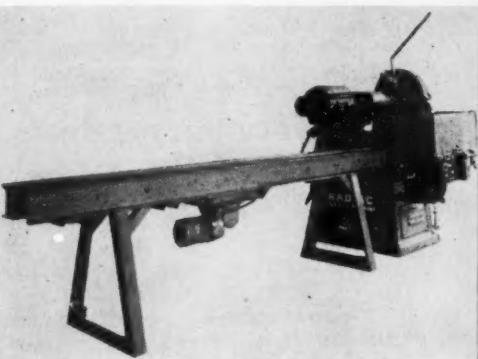
new equipment . . .

controls for one-position operation. This machine, with air hydraulic driven cutting head, is sturdily built to eliminate vibration. It is arranged for both air hydraulic and manual operation of the cutting head. A separate valve controls the continuous operation of the oscillating air cylinder. The machine is arranged with a wheel guard to accommodate a 20 inch diameter abrasive cut-off wheel, which is driven by seven vee belts and a 15 h.p. ball bearing motor. The motor is operated by a magnetic starter with a remote start-stop pushbutton.

Coolant is supplied from a storage tank and pump, located within the base of the machine, and is directed with two jets on the abrasive wheel and work at the point of cutting. Coolant pump motor is operated by a separate manual starter.

The machine is equipped with a quick acting, air operated vise. The moving jaws are of the equalizing type. Work is clamped in the vise on both sides of the abrasive wheel.

Two sets of interchangeable abrasive wheel flanges are supplied—8 and 4



Radiac Type "JOAH" Wet Cutting Abrasive Cut-Off Machine shown with work rest

February, 1960

inch diameters. The inside wheel flanges are provided with a keyway to fit over a key on the spindle shaft. The 4 inch flanges allow the wheel to be worn to a minimum diameter.

The cutting head is set in motion by manually depressing an air control pushbutton. An emergency rod is provided to immediately reverse the down stroke of the cutting wheel, returning the wheel to its original position. At the completion of each cut, the cutting wheel automatically returns to its uppermost position.

For more data circle 121 on Postpaid Card

★ m m s ★

CABINET MOUNTING FOR PRESS

Sturdier anchorage and convenient tool storage are two important extra advantages offered in the cabinet mounted



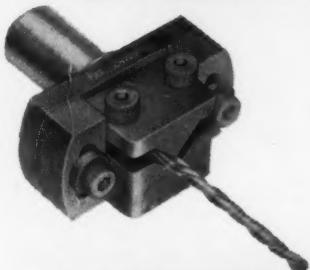
W. A. Whitney Cabinet Mounted Press

Nos. 91 and 92 Presses, available from W. A. Whitney Mfg. Co., 636 Race St., Rockford, Illinois.

Constructed of heavy gauge, welded sheet steel, the cabinet is firmly secured to the floor with anchor bolts. This sturdy base permits operation of these hand presses to their full rated 10 ton capacity.

As many as 28 sets of punches and dies can be stored in racks on slanted

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DA-12	$\frac{1}{4}''$ — $\frac{1}{2}''$	DA-12	$\frac{1}{4}''$ — $\frac{1}{2}''$	$\frac{3}{4}''$
GA-12	$\frac{1}{4}''$ — $\frac{3}{8}''$	GA-12	$\frac{1}{4}''$ — $\frac{3}{8}''$	$\frac{3}{4}''$
GA-16	$\frac{1}{4}''$ — $\frac{3}{8}''$	GA-16	$\frac{1}{4}''$ — $\frac{3}{8}''$	$1''$
KA-16	$\frac{1}{4}''$ — $1''$	KA-16	$\frac{1}{4}''$ — $1''$	$1''$
KA-24	$\frac{1}{4}''$ — $1''$	KA-24	$\frac{1}{4}''$ — $1''$	$\frac{1}{2}''$
PA-24	$\frac{1}{4}''$ — $1\frac{1}{2}''$	PA-24	$\frac{1}{4}''$ — $1\frac{1}{2}''$	$\frac{1}{2}''$
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BROOKFIELD, INCORPORATED

STOUGHTON 111, MASSACHUSETTS
For more data circle 574 on Postpaid Card

new equipment . . .

shelves in the rear of the cabinet. A chute guides slugs to a container within the cabinet for extra convenience.

The base of the cabinet is 14 by 26 inches; die height is 38½ inches on the No. 91 and 40½ inches on the No. 92. The complete cabinet weight is only 75 pounds.

For more data circle 122 on Postpaid Card

★ modern machine shop ★

PORTABLE COOLANT PUMP

The Dunham Tool Co., Inc., New Fairfield, Conn., announces a self-contained portable coolant pump, the "Tool Cool," which has been designed to improve finish and which is said to increase tool life at one-half the cost.

Lightweight, low profile construction provides for easy handling. A 3,000



The Dunham "Tool Cool" Coolant Pump

r.p.m. fan cooled motor delivers 190 gallons per hour at 4 foot head. Non-corrosive adjustable pump is mounted directly to a 2½ gallon capacity tank with 12 feet of plastic hose.

For more data circle 123 on Postpaid Card

★ modern machine shop ★

PLUNGER TYPE TOGGLE CLAMP FEATURES SWIVELLING HANDLE

A plunger type toggle clamp, with a swivelling handle for use where clearance requirements do not permit using conventionally designed clamps, has been added to the standard line of De-Sta-Co Clamps. Designed for medium duty holding applications, the clamp, designated Model 606, was developed by Detroit Stamping Co.,

RELIANCE

Angle Dresser \$37.50 Radius Dresser \$57.00

Shipped on 10-day Money-Back Guarantee

Angle Dresser guide block is hardened and honed, push bar is hardened and ground. Radius Dresser bearing adjustment is lifetime. Both tools are finished in black wrinx enamel. Diamond, \$7.50. Several territories open for distributors.

DIAMOND SUPPLY CO. OF AMERICA
7658 Waukegan Rd., Niles 48, Ill.

For more data circle 575 on Postpaid Card



HAUSER Die Handler

For tool rooms, inspection, press and try-out departments.

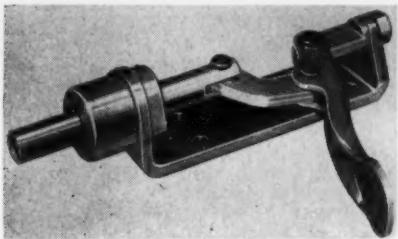
Mobile or stationary, 180 degrees rotation of punch. Locks in any position. 24" x 40" base table. Ball bearing construction.

Dealer inquiries invited.

WRITE FOR DETAILS

HAUSER MFG. CO. 234 MILL STREET
ROCHESTER 14, N. Y.

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De-Sta-Co Plunger Type Toggle Clamp

349 Midland Ave., Detroit 3, Mich. The handle swivels in a 220 degree arc and can be fixed in any position within this arc by a locknut, located on the axis of rotation.

Rated holding pressure is 450 pounds. A tapped hole in the plunger allows the use of an adjusting spindle for extending its reach. The base, which is only $1\frac{1}{8}$ inches wide, has six mounting holes for easy positioning on standard tooling and aircraft industry assembly plates. Overall clamp length with the plunger in an extended position is $6\frac{1}{2}$ inches. Plunger travel on a complete stroke is $1\frac{1}{8}$ inches. Height from the base to the centerline of the plunger is $\frac{7}{8}$ inch.

Plungers are centerless ground and iridite coated for wear and corrosion protection. Cadmium plating is used for base and handle protection.

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TANGENT-ARC PROFILE GRINDER

The Hartex No. 3 Tangent-Arc Profile Grinder, illustrated and described on Page 170 of the January issue, was originally designed, developed and is used by The Union Twist Drill Company, Athol, Massachusetts, for the manufacture of high grade cutting tools. The machine was not designed by the Hartex Division, as erroneously stated in the article.

For more data circle 125 on Postpaid Card

Micro Center Drills & Countersinks



No.	Diameter		Length		Price Each	
	Drill	Body	Drill	Overall	Right Hand	Left Hand
00	0.020"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$1\frac{1}{8}$ "	\$1.45	\$1.70
01	0.025"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$1\frac{1}{8}$ "	1.20	1.50
0	1/32"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$1\frac{1}{8}$ "	1.10	1.35
1	3/64"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$1\frac{1}{8}$ "	.95	1.20
2	1/16"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$1\frac{1}{8}$ "	1.00	1.20
3	3/32"	$\frac{1}{8}$ "	$\frac{1}{8}$ "	2"	1.00	1.30

60°HSS Available immediately from stock.
A Tool For The Hard To Do Job

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66-40 108 St. • Tel: BO 3-8973 • Forest Hills 75, N.Y.

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Special Tools — Dies — Machines
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731 LORAIN AVENUE
DAYTON 10, OHIO

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MODERN MACHINE SHOP 265



GRINDS THEM ALL!

Radii, angles or tangents . . . straight or tapered flutes . . . square, radius or ball ends . . . this machine grinds practically any special or standard cutting tool quickly, accurately, economically. Learn how you can reduce tool costs, improve work quality, cut machining time — write for Circular No. S455-8.

PRATT & WHITNEY CUTTER and RADIUS GRINDER

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"MULTI-FLO-REFORM" PROCESS

A further development and expansion of the Flo-Reforming Process has been announced by Lodge and Shipley Co., Floturn Division, 3058 Colerain Ave., Cincinnati 25, Ohio. The new process is termed "Multi-Flo-Reform" and differs from the previous operation in that substantially longer parts can be produced.

A typical example is a 2½ inch diameter shell which is formed to a depth of 14 inches in just three forming operations. In comparing Multi-Flo-Reform with deep drawing, Lodge and Shipley Floturn Division personnel commented that the new process (for the part cited) requires ten distinct operations including blanking, Floturn, washing, annealing, trimming and reforming. If it is practical to produce

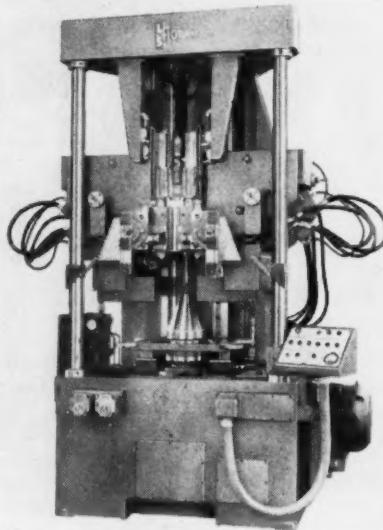


Figure 1—No. 12 Vertical Floturn Machine

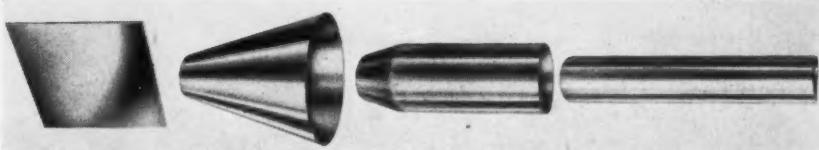


Figure 2—Illustration shows sequence of Lodge and Shipley Flo-Reform Process

the same part by means of deep drawing, a minimum of 28 operations would be required including blanking, nine draws, washing, annealing and trimming.

In producing the 14 inch deep shell, Lodge and Shipley starts with a 7½ inch diameter flat blank which is formed into a cup by Floturn, approximately 7¾ inches deep. This cup is elongated and brought closer to the finished cylindrical form in the first Reform operation. The cup depth at this point is approximately 10½ inches. In the second and final Reform

operation, it is claimed that the work-piece attains a perfect cylindrical shape, 14 inches long.

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HYDRAULIC CYLINDERS

Series "H" Hydraulic Cylinders are now available with straight thread parts as a standard, according to Hannifin Co., Power Cylinder Division, Dept. 166, 565 South Wolf Rd., Des Plaines, Illinois.

Extensive research has shown that the use of straight thread cylinder



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A Complete Line of the
Highest Quality

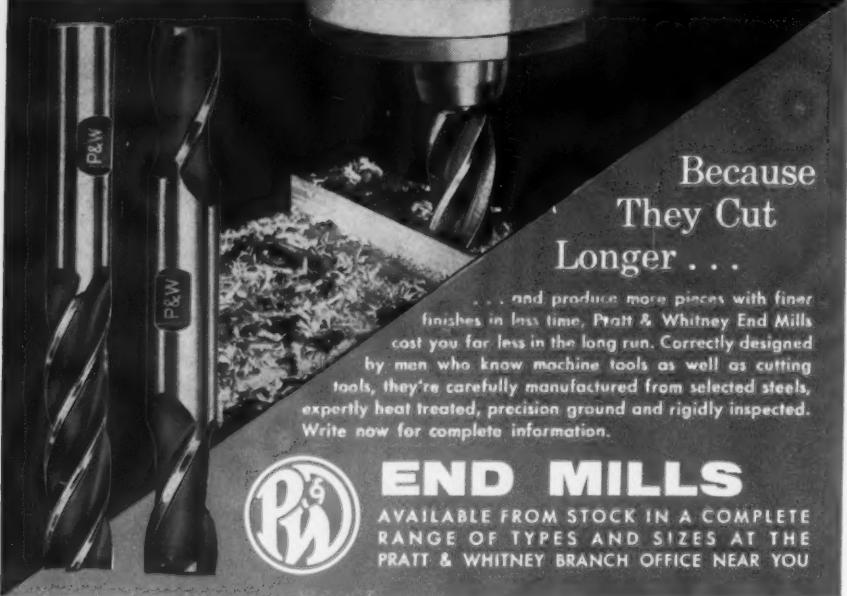
Whatever your needs, you can get the right standard or special milling cutters to do the job better from one convenient source... Pratt & Whitney. Like all other P&W Cutting Tools, you can be sure they'll cost you less in the long run... because they run longer! Write now for complete information. Pratt & Whitney Company, Inc., 25 Charter Oak Boulevard, West Hartford, Conn.

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Because
They Cut
Longer . . .

... and produce more pieces with finer finishes in less time. Pratt & Whitney End Mills cost you far less in the long run. Correctly designed by men who know machine tools as well as cutting tools, they're carefully manufactured from selected steels, expertly heat treated, precision ground and rigidly inspected. Write now for complete information.



END MILLS

AVAILABLE FROM STOCK IN A COMPLETE RANGE OF TYPES AND SIZES AT THE PRATT & WHITNEY BRANCH OFFICE NEAR YOU

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ports eliminates many of the leakage problems associated with pipe thread cylinder ports. Other benefits include: no distortion due to the wedging action of a pipe thread connection; elimination of pipe dope; exact positioning of the fitting without overtightening or back-off; immunity to leakage caused

by extreme temperature variance or shock conditions; and mechanically rigid connections, since fittings work on the full thread surface.

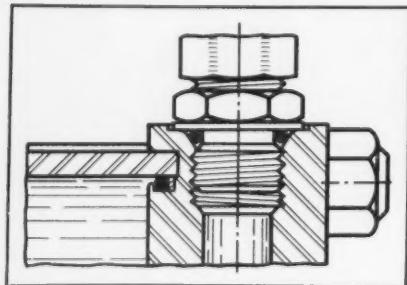
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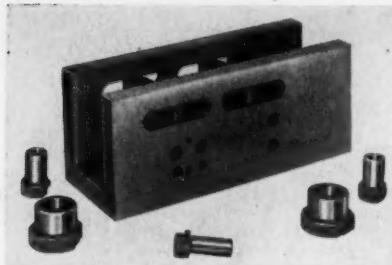
STANDARD CAST IRON SECTIONS FOR JIGS AND FIXTURES

Standard Micron cast iron shapes are available from Ex-Cell-O Corp., Detroit 32, Mich., for the economical building of small jigs and fixtures. Shapes include U's, T's, H's, hollow squares, rectangles and flat plates. They are cast in a practical range of sizes from 3 to 8 inches and lengths of 25 inches, which are cut to order.

Micron sections give a rigid structure for making drilling and milling jigs without welding and with a minimum of machining. They are made of



Cylinder has straight thread ports



**Ex-Cell-O Standard Micron Cast Iron Shapes
for building small jigs and fixtures**

high tensile strength cast iron with all outside surfaces machined square and parallel within 0.005 inch per foot.

For more data circle 128 on Postpaid Card

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FUNCTIONAL ACCESSORY GROUPS FOR ELECTRIC FURNACE

Thermo Electric Mfg. Co., 488 Huff St., Dubuque, Iowa, announces six

functional accessory groups that let one model electric furnace perform several distinct operations. The following accessories make Type 2100 Thermolyne Furnace even more adaptable and versatile than before as a salt bath, oil bath, melting, vertical muffle or crucible furnace: Two special-alloy stainless steel pots with cover for liquid heating to 1,000 and 1,600 degrees F., a safety lifting handle for the pots, a perforated stainless steel small parts basket with lifting handle, a perforated stainless steel skimmer for removing sludge or crust, a graphite melting ladle for use to 1,700 degrees F. with unique no-slip lifting handle, a high temperature refractory chamber liner and a heavy well-insulated refractory chamber cover.

The laboratory or shop user selects the combination of accessories best suited to his needs. He will find that Type 2100 Furnace is capable of a variety of investigative and pilot runs,

PRATT & WHITNEY

New TRANS--LIMIT Comparators

ULTIMATE IN ACCURACY, RELIABILITY and STABILITY

These fully transistorized instruments provide 4 instantly available magnifications - thousandths, ten-thousandths and millionths. Gaging pressure less than 1 oz. won't distort the most delicate parts. Accuracy not affected by normal voltage and frequency fluctuations. Exclusive "mirror-back" pointer eliminates reading errors due to parallax. Available as: External Comparator, Height Gage, Snap Gages and Cartridge Units - all combining production-line ruggedness with gage lab accuracy.



Ask for Circular No. 623
PRATT & WHITNEY CO., Inc.,
25 Charter Oak Blvd.,
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MACHINE TOOLS • GAGES • CUTTING TOOLS

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Thermolyne Type 2100 Electric Furnace

as well as short run production and the heat treating of small parts.

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GRINDER DEBURRS AND CHAMFERS SIMULTANEOUSLY

A twin spindle, automatic, high speed grinder, designed to simultaneously deburr and chamfer the entire contour of both ends of the teeth on spur, helical or bevel (heel and toe) gears, is announced by Michigan Tool Co., 7171 East McNichols Rd., Detroit

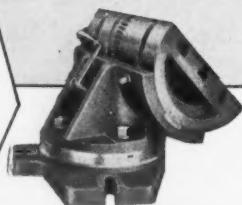


Twin Spindle Automatic High Speed Grinder

12, Mich. The grinder drives reinforced wheels at 17,000 r.p.m. with standard air spindles. Spindles rotate in directions to prevent wheels from "digging in." The standard machine will handle gears from 3 to 13 inches outside diameter, other models are available for gears to 20 inches outside diameter. To operate, it is only neces-

BOSTON UNIVERSAL ANGLE PLATE

A Precision
Tool that
Holds Work
at Any De-
sired Angle.



**Puts Speed and Profit
into Angular Drilling, Milling,
Planing, Shaping, Grinding**

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes.

Write today for full information.

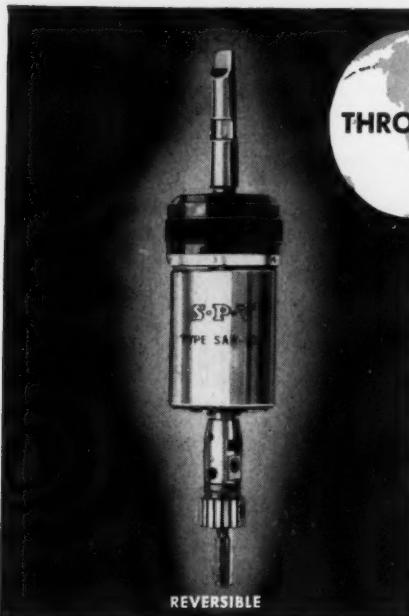
US AUTOMATIC BOX MACHINERY CO., Inc.

40 ARBORETUM ROAD • BOSTON 31, MASSACHUSETTS

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THROUGHOUT THE WORLD...IT'S

S·P·V



NEW SAR Reversible

(for all machines)

- * Friction free axially floating spindle
- * Tap works as its own leadscrew
- * Instantaneous release and unloading of clutch. Resets automatically to preset torque
- * Complete protection of workpieces and taps

Cap. in:	SAR 50	SAR 100
Steel SAE-1035	#0 - #8	#5 - 3/8"
Axial float	13/32"	1 1/16"
Recommended R.P.M.	2000	1000
Length	5 1/4"	7 5/8"
Max. dia.	1 3/4"	2 3/4"

S A Non-reversible

(for machines with reversing spindles only)

- * Consistently perfect threads
- * Precision engineered clutch
- * Immediate release when tap bottoms or loads
- * Quick change of taps when different size holes are tapped in the same work piece (or 2nd and finishing tap)

	Length Incl.	Shank	Diameter	Range
SA-OE	5 5/16"	1 3/4"		0-1/4"
SA-1B	7 7/8"	2 3/4"		1/4-3/16"
SA-2B	11"	4"		5/16-1 1/8"
SA-2 1/2B	14 1/16"	5 1/8"		1 1/8-1 1/2"
SA-3C	15 3/4"	6 1/2"		1 1/2-2"

Manufacturers representatives and dealer inquiries invited!

For more data circle 583 on Postpaid Card

February, 1960

TAPPING ATTACHMENTS

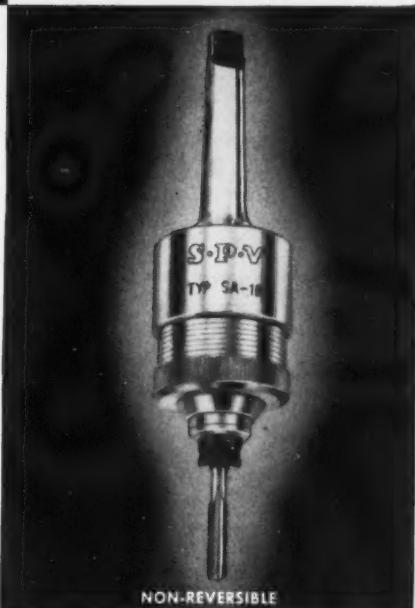
The S.P.V. tapping attachments eliminate axial friction. The axial movement of the tap is guided by steel balls (two-point rolling friction) and is controlled only by the torque and the tap itself.

Clutch design eliminates all undesirable forces on tap.

Torque is determined in seconds.

Homestrand
INCORPORATED

LARCHMONT, N.Y.



NON-REVERSIBLE

MODERN MACHINE SHOP 271

new equipment . . .

sary to start the wheel spindles, place the gear on the fixture and press two buttons to start the machine cycle. Where necessary, air clamping is provided. Many gears (see illustration) do not require clamping. The fixture starts rotating and tilts upward. Grinding wheel spindles lower to contact the work and deburring starts. After a pre-

set number of rotations of the gear, during which the grinding wheels rise and fall to follow the contour of the heel and toe, the spindles are raised, the fixture is lowered to unload position and fixture rotation is stopped, all automatically.

Number of rotations of the gear is determined by the depth of chamfer desired. Cycle time set on the adjustable timer is determined by the number of rotations required, the pitch of

the gear and its size, varying from 20 to 60 seconds per gear. Gear rotation speed is selectively adjustable and counterweights, incorporated in the spindles, are adjustable to vary grinding pressure on the work.

All cylinders and wheel spindles are air operated, with shop air pressure regulated at the machine. Gear rotation is accomplished with a fractional-horsepower electric motor. Depending on gear size, wheel diameters from 1.75 to 3.00 inches are used. To equalize wear on both sides of wheels, they are interchanged on the spindles after about 4 hours.

Operator is shielded by a protective hood, but can view the process through

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- Tells how to select Ideal Gold Band Live Centers to fill your needs exactly. Over 40 different sizes and styles in 4 models—Universal, Multi-Duty, Heavy-Duty, Pipe Point—custom quality performance at production prices.

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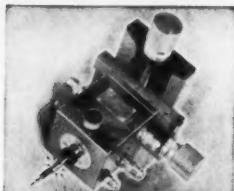
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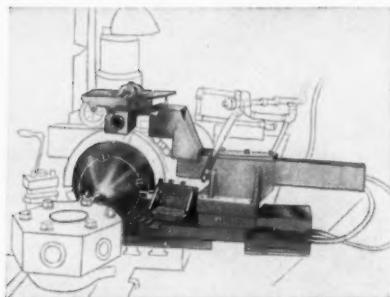
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All MIMIK® Tracers—

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- Require only minutes to install.
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- Are easy to set up.
- Can use templates or round masters.
- Fully guaranteed.
- Have unequalled accuracy.
- Have micrometer settings on X & Y.
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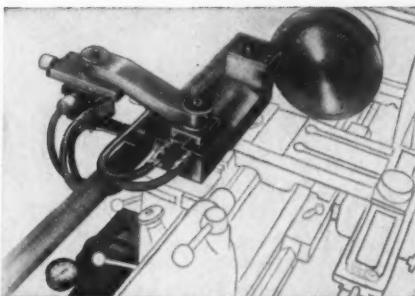
MIMIK® can do all these things because its unique valve is so incredibly versatile there is practically no limit to the way it can be applied in a Tracing System.

Your MIMIK® Tracer will pay for itself in months, not years, and not only will slash costs, but will enable your existing machine tools to do work far beyond their present capacity.

**THE RETOR®
MIMIK®
HYDRAULIC
TRACER**

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February, 1960



▲ "9000" Series for Engine Lathes:

- Six standard models to fit any lathe.
- Replaces existing compound.

◆ "5000" Series for Turret Lathes:

- Rear mounted on ram type.

◆ "3000" Series for VTL's:

- No machine tool conversion.
- Fits into ram or turret like conventional toolholder or replaces tool post on side head.



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East Coast—Farmington Mfg. Co., Farmington, Conn.
Central—Bartsch Tool Corp., 6570 N. Harlem, Chicago.
West Coast—Allied Pacific Mfg. Co., 17825 S. Santa Fe Ave., Los Angeles.

Sales Representatives in all major U.S. and Canadian cities.

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585 on Postpaid Card

MODERN MACHINE SHOP 273

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a window, which is located in the hood. The hood also incorporates an exhaust outlet designed for dust collector hook-up.

Wheel spindles are fully adjustable to position grinding wheels for different gear sizes.

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PRECISION HIGH SPEED DRILL PRESS

A 14 inch Hi-Speed Drill Press, with speeds up to 12,000 r.p.m., is introduced by Rockwell Mfg. Co., Walker-Turner Division, Dept. WL-22, 400 North Lexington Ave., Pittsburgh 8, Pa. Engineered for high speed, small hole drilling where precision and sensitivity are needed, the press is ideal for manufacturers of

specialty parts, jewelry, electronic devices and similar equipment. It is recommended for all drillable materials, particularly precious metals, phenolics and non-ferrous metals such as aluminum, brass and copper.

Drill breakage and work spoilage is reduced by a counterbalanced quill that eliminates quill drop at break-through on through holes.

Vibration-free, accurate operation is assured by preloaded, lubricated-for-life ball bearings with a 14 spline "floating" sleeve drive. This sleeve drive includes a taper-hole mounted spindle pulley, lapped quill and so on.

This press is available in single spindle models or with any number

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for the FIRST TIME

REAL INTERCHANGEABILITY IN UNITIZED TOOLING

NEW UNIPUNCH "AJ" Units permit interchangeability with **UNIPUNCH "A" Units** and with **UNITS AND PARTS of OTHER LEADING MANUFACTURERS**

Unipunch "AJ" Hole Punching Units have the standard 8 $\frac{3}{8}$ " shut height, and 3 $\frac{1}{2}$ " die height, plus $\frac{3}{4}$ " thick mild steel capacity.

ALL-STEEL HOLDERS have longer life, higher tensile strength, longer wear and greater bearing surface than previously available.

Pedestal Dies are ideal for punching angles, extrusions, channels, and parts with lips and flanges.

Die Adapters provide quick interchangeability of standard inexpensive Die Buttons.



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JIG BORING MACHINE

WITH LEITZ OPTICS

Table size —
33½" x 18½"
Spindle speeds —
63 — 2000 RPM
Boring depth — 12"
Net Weight — 7500 lbs.



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Select any point as starting
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millions without leaving
operator's position.

Direct reading on magnified
screens in any quadrant from
zero point. Table moves on
double roller guides.

When only the best will do — check MSO first.



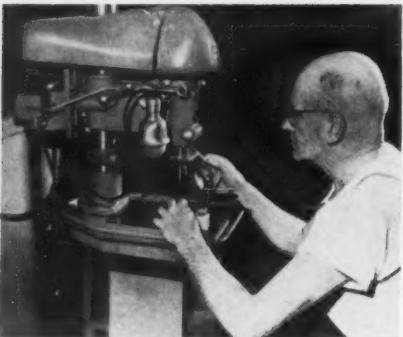
austin industrial corporation

76-H Mamaroneck Avenue

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White Plains, New York

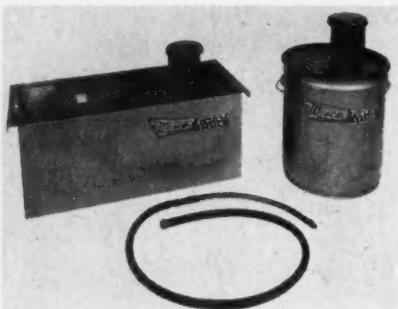
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"Hi-Speed" 14 Inch Sensitive Drill Press

spindles in multiple spindle setups. Both single or multiple spindle models come with production table, No. 72-1/4 inch key chuck and choice of single, three phase or d.c. 1/3 h.p. motor.

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Wesco Pump Unit keeps cutting tools cool

PUMP UNITS

Wesco Tool, Inc., 2820 San Fernando Blvd., Burbank, Calif., announces a pump unit. The main purpose for using it is to keep the cutting tools cool during their operation and increase their cutting life and speed.

The Wesco Pumps are recommended to be used on drill presses, lathes, grinders, saws, abrasive belts, milling machines and almost any other type of machines that require coolant.

Wesco Pumps reduce friction and heat from a specified job and can be used with a wide range of coolants.

The Wesco Pump Units may be purchased in five gallon containers, 12 gallon containers and 40 gallon containers. The motor sizes are 1/20 h.p. up to 1/2. These units can be used with oil, oil soluble and so on.

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CERROTECHNIKS

expedites

many time-consuming industrial tasks

CERROTECHNIKS encompasses various methods of employing CERRO® ALLOYS (bismuth-lead-tin-cadmium) to shortcut many laborious industrial operations. These procedures can save valuable time and lower costs in:

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- Holding permanent magnets
- Making chuck jaws—molds for plastics
- Reclaiming cracked dies
- Securing punches and dies
- Reproducing master patterns

And 55 other jobs you can do better, in minutes instead of hours, using CERROTECHNIKS.

*T.M. Cerro de Pasco Corporation

Send for our new "HOW TO" booklet, No. J4.

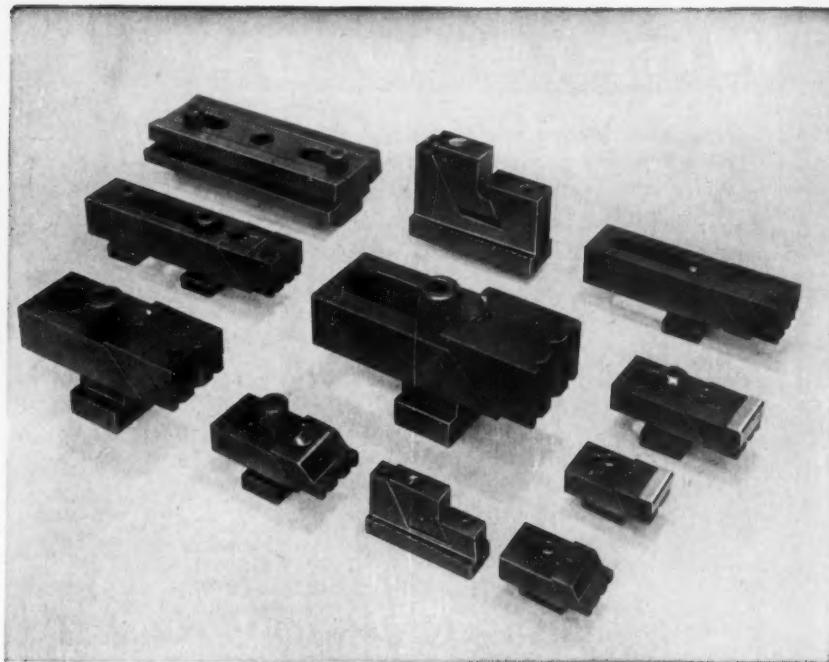


CERRO DE PASCO SALES CORPORATION
304 Park Avenue, New York 22, N.Y.

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CORRECTION

In the item on the new T-A Wesson Toolholder, published beginning on Page 258 of the January issue, the statement pertaining to chipbreakers should have read "Chipbreakers can be adjusted and inserts can be inverted, indexed or replaced, after loosening the screw only 1/2 turn", instead of as published.



Where you can get...

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

Faster Set-up with any of the 5 Models of J & S Jaw Clamps—one adjusting screw has a holding force of $2\frac{1}{2}$ tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems — no interference with measuring tool readings.

See your industrial distributor or write today for free literature.

WHEEL DRESSERS **J & S**
TOOL CO., INC. JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES

J & S TOOL CO., INC.

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CLAMP CUT ■ ■ ■

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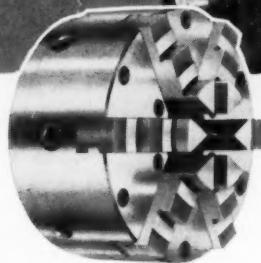
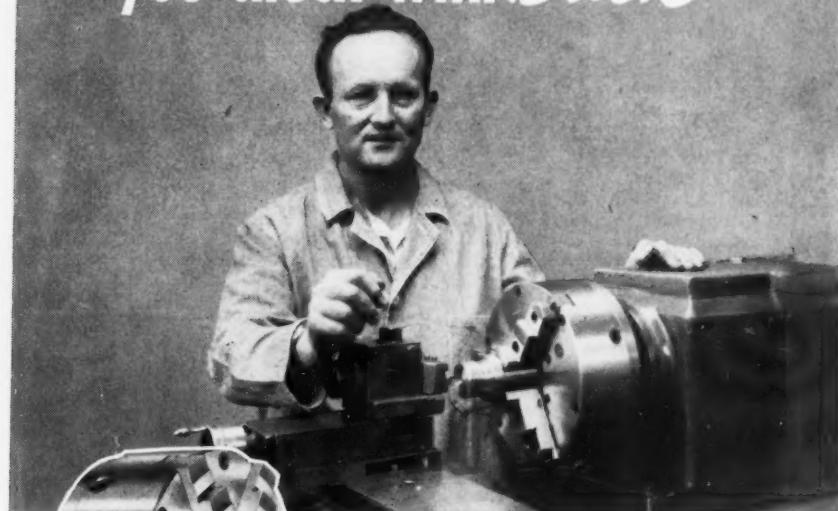
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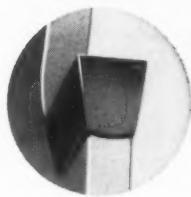
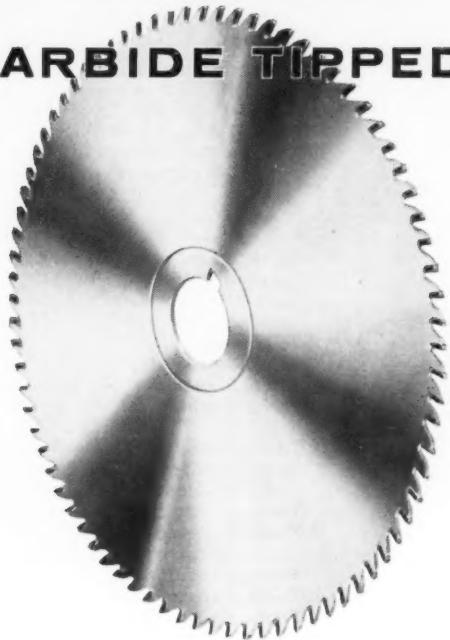
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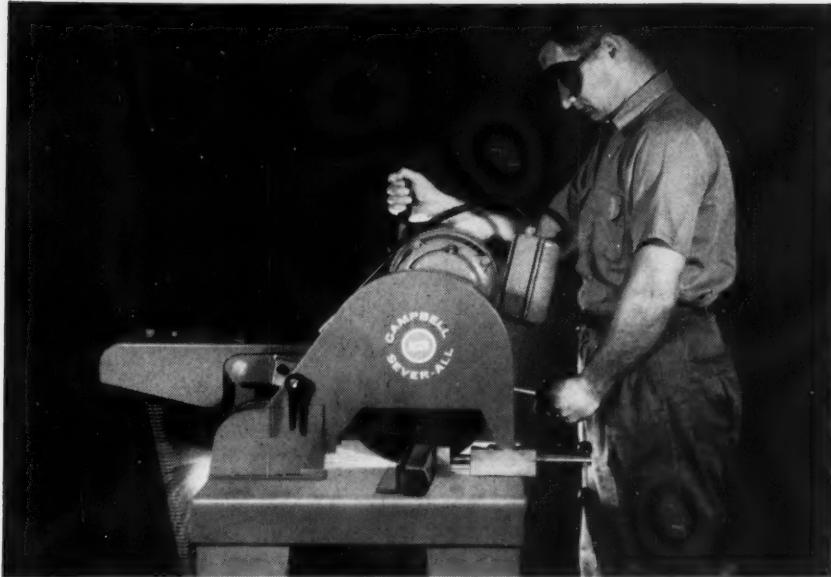
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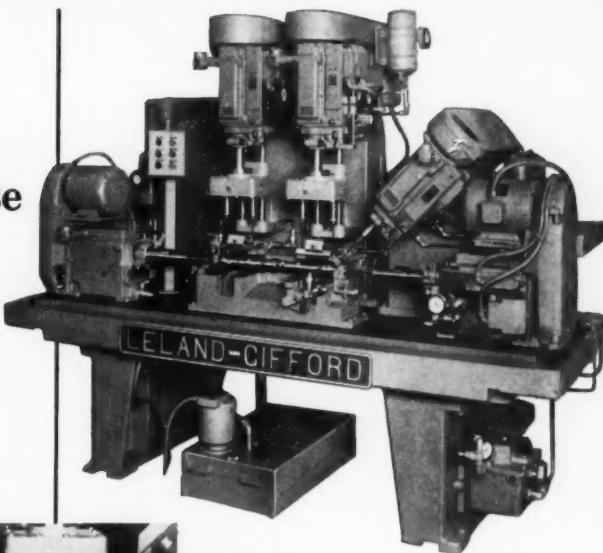
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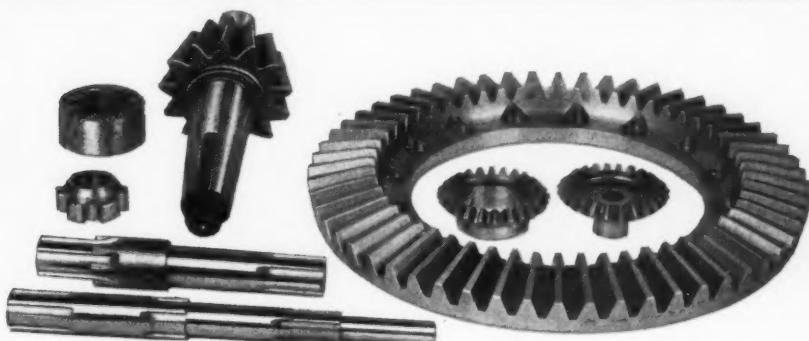


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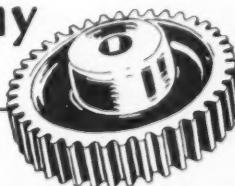
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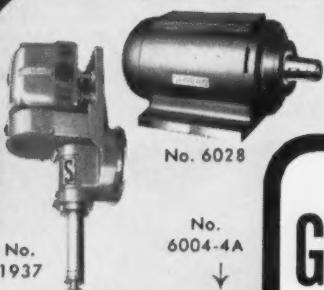
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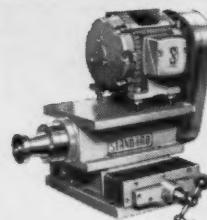
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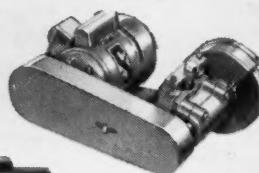


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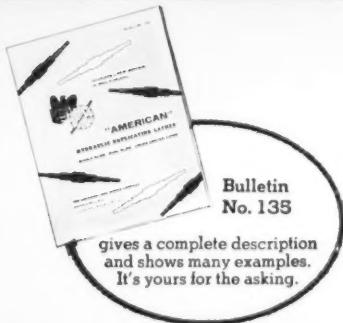
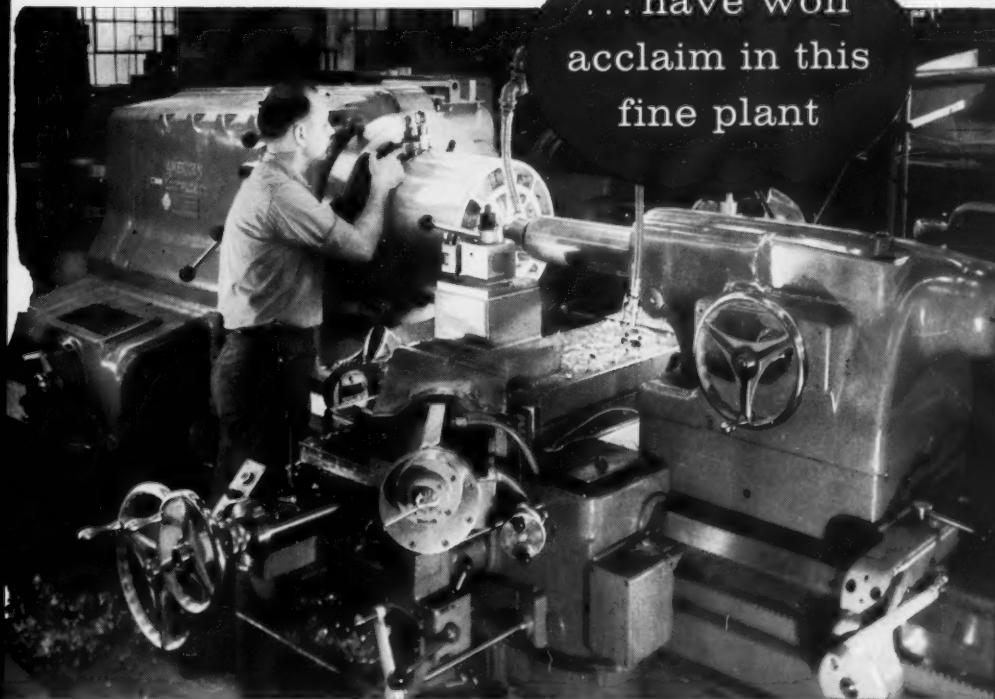
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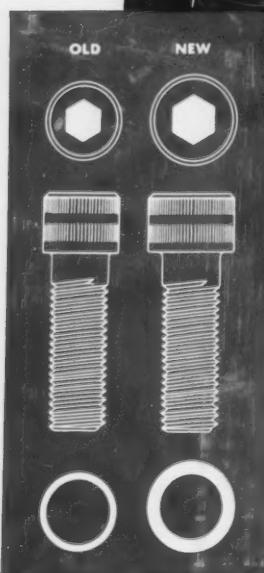
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